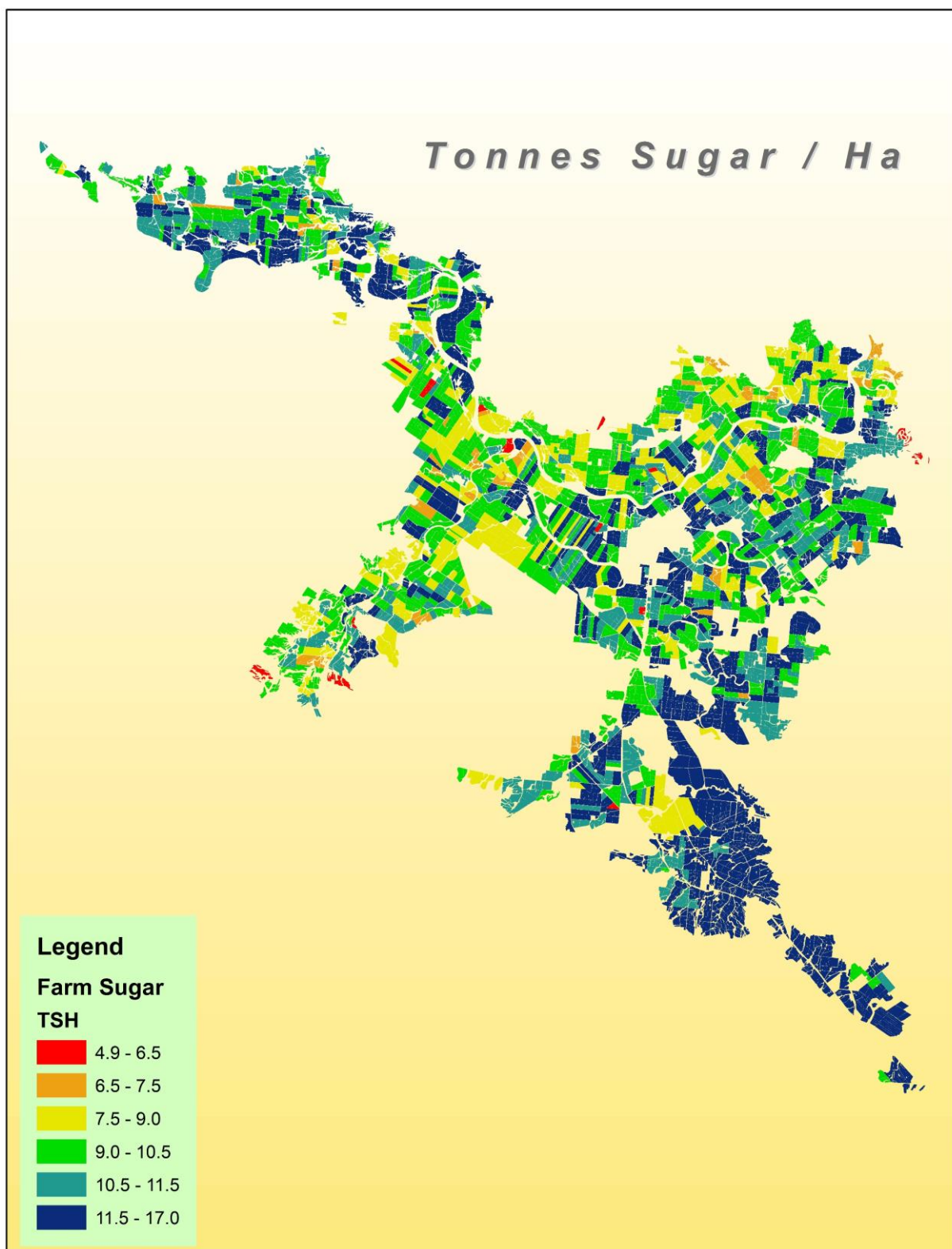
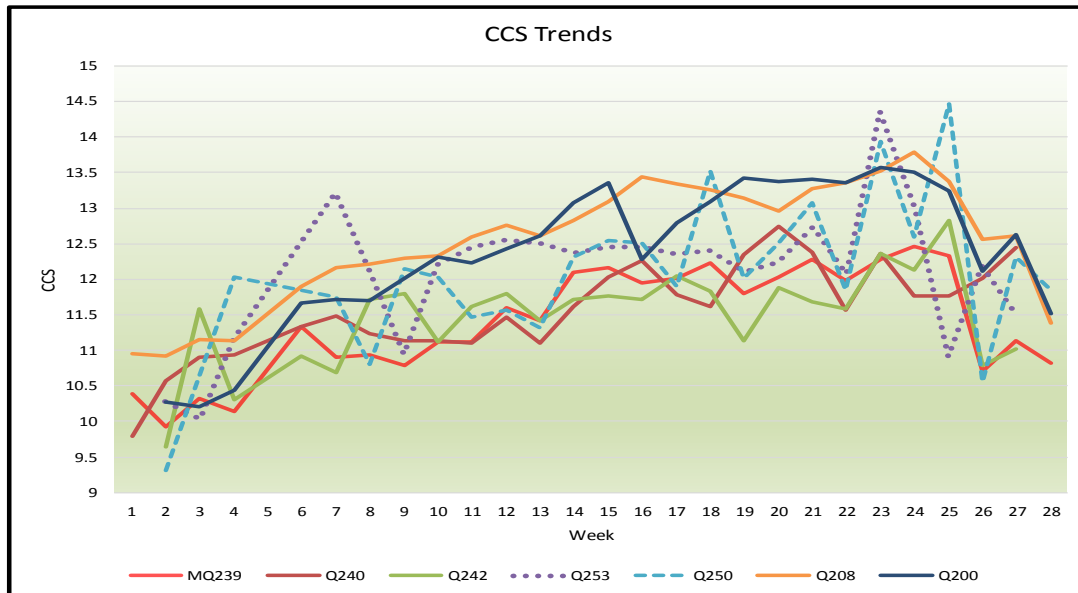




HERBERT SUGAR INDUSTRY REPORT 2016



CROP PERFORMANCE 2016



The prolonged dry experienced early in the crops growth and the mild wet winter contributed to the good cane and poor ccs experienced for the 2016 crop. The end result however was much better than expected. The 2016 district average yield was 85.7 tcph with a CCS average of 12.3, with the district harvesting 4.81 million tonnes. The 2015/2016 wet season was very mild with little heavy rain falling up until March. Good rains in June 2016 allowed the crop to grow on throughout the very mild winter months, but this had the impact of lower than expected CCS levels. The yield was the highest yield experienced for the region in the past 5 years, but the lowest CCS levels in many years. Cane yields were exceptionally high in the area south of Toobanna, which received early storm rains in December 2015 – January 2016, setting up these sub-districts for a huge crop. The Herbert region's 2016 crushing season was finalised at Victoria Mill about 8.30pm on Wednesday 29th. December. Dedicated harvesting and mill crews celebrated Christmas at work because operations did not stop for the Christmas holiday period. The finishing date was delayed due to the loss of 2-3 weeks crushing, following heavy rains in June and the rain events after the 10th of December. This finishing date was one of the latest in the district's history. Due to the December rains and late finish, approximately 40,000 tonnes of standover was left in the field for harvest in 2017.

HISTORICAL DATA

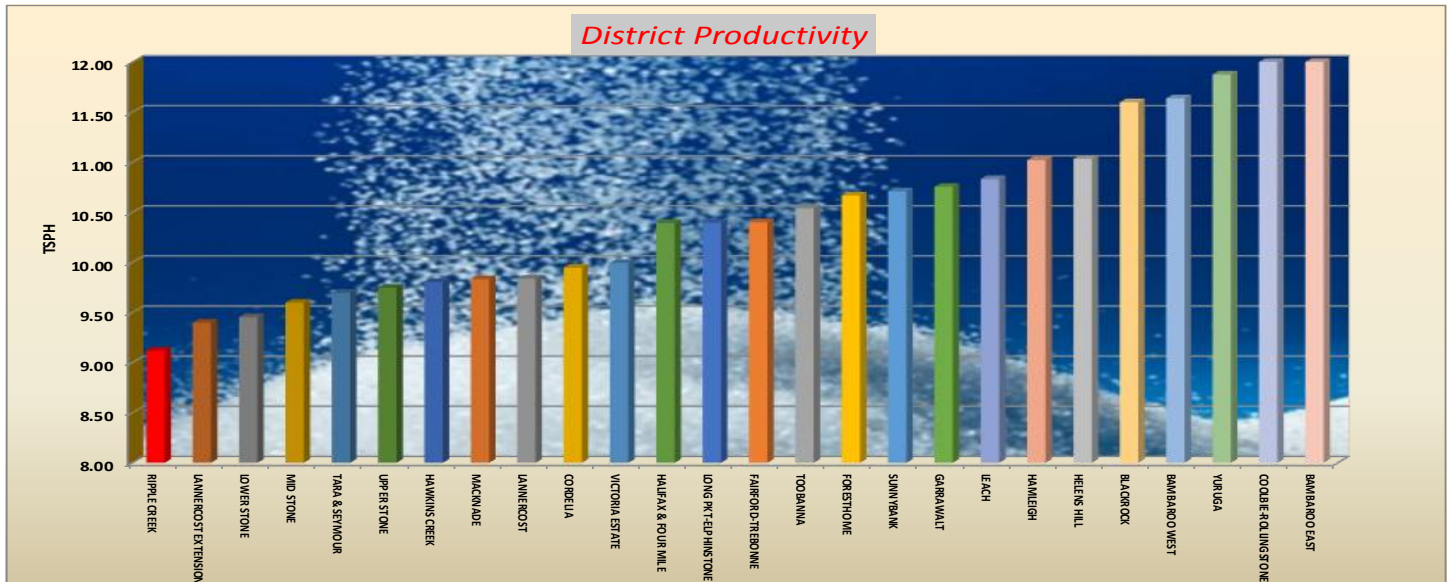
Year	Tonnes	Ha Harvested	CCS	Cane Yield	Sugar Yield
1997	5272421.61	57328.33	13.37	91.97	12.29
*1998	4191272.31	48669.90	11.46	86.12	9.87
**1999	4151741.51	59955.95	12.73	69.25	8.81
2000	2802049.39	58379.16	13.01	48.00	6.24
2001	3311004.97	56876.94	14.34	58.21	8.35
2002	4243591.27	54892.20	14.40	77.31	11.13
2003	4051558.05	56975.69	13.90	71.11	9.89
2004	4641372.86	56410.75	13.56	82.28	11.16
2005	5553359.05	57078.93	13.11	97.29	12.76
2006	4900084.45	57658.50	12.62	84.98	10.72

* Standover Left

** Standover Harvested

Year	Tonnes	Ha Harvested	CCS	Cane Yield	Sugar Yield
2007	4287010.73	57158.66	13.84	75.00	10.38
2008	4688595.64	55061.21	13.54	85.15	11.53
2009	3920941.21	51171.33	14.79	76.62	11.33
*2010	3274402.07	39567.98	12.85	82.75	10.64
**2011	2920400.98	52364.64	12.89	55.77	7.19
2012	3625680.08	50394.18	13.57	71.95	9.77
2013	4000685.4	54017.57	13.95	74.06	10.33
2014	4152315.8	55800.99	13.62	74.41	10.13
2015	4459593.6	56615.75	13.41	78.77	10.56
2016	4812090.08	56166.82	12.26	85.67	10.50

District Productivity



HCPSL YEAR IN REVIEW



2016 was a year of surprises with virtually no wet season and then good rains in June leading to higher than expected cane yields, lower than expected CCS, a strong sugar price and a very late harvest finish. We hit the **Target 85** goal in 2016. This being the 12th time since 1950 that the region has exceeded an average district yield of 85.7 tchp. 2005 was the last time the district exceeded 85tchp. The HCPSL **Target 85** program aimed at getting the Herbert industry back on track to achieving high productivity achieved a number of milestones during 2016. HCPSL continues to work with industry to achieve positive environmental outcomes and industry sustainability. The most notable HCPSL achievements in 2016 were -

Crop agronomy

- Undertook a large variety x herbicide trials to quantify phototoxic effects for most new varieties.
- Commenced or continued 16 Project Catalyst trials assessing innovative farming practices.
- A new Everris Controlled Release fertiliser trial assessing a number of new products was established at the HCPSL Macknade Research Farm in 2015.
- HCPSL was contracted by Arysta for 2 trials to assess a new residual herbicide, Amitron, which could be used to replace Diuron within a farming system.

Crop improvement

- The continuation of the joint funded HCPSL/ SRA Ratoon Variety Trials. These trials were established in 2013 to assess varieties on difficult environments in the Herbert region. These trials complement the SRA core plant breeding program.
- Supported SRA to establish cane introgression seedlings at the HCPSL Macknade Research Farm.
- Assisted SRA harvest 4 introgression plant breeding research trials throughout the district.

Variety management

- Supported SRA through a SRA funded project to investigate productivity drivers for the Herbert, while developing tools to allow growers to utilise varieties better.
- Undertook farm variety planning for 20% of the area planted in 2015, through QCANESelect.

Biosecurity and disease management

- Provision of over 1200 tonnes of approved seed cane to growers; with the bulk of this cane being supplied as whole stalk.
- Sale of approximately 3500 tissue cultured plants to growers.
- Continued work associated with the management of the *Pachymetra* root rot following the survey work completed in 2015. This survey highlighted that there were considerable high levels of the disease in the soil throughout the district. Growers on impacted farms are urged to plant resistant varieties to manage the issue.

Pest management

- Continued funding the Hinchinbrook Community Feral Pig Management Programs leading to a significant reduction in feral pig damage to cane crops.
- Work with SRA to investigate the opportunity to use remote sensing to predict cane grub incursion.

YCS management

- Assisting SRA funded projects on YCS. HCPSL made its own investment into a trial to assess management practices to better manage YCS in 2015 and this trial was harvested in 2016. The data generated from this work will assist growers make better management decisions concerning YCS.

Drainage

- Continuation of laser levelling surveys and dumpy level surveys to improve in-field drainage.

Precision agriculture

- Continuation of the HCPSL Yield Mapping project, mapping over 20,000 hectares annually. The maps generated are now being used by industry to site specific manage cane blocks within a farm.
- The continuation of the Terrain NRM and HCPSL funded soil mapping project with the University of New South Wales. This project is investigating ways to increase productivity through the use of electronic soil mapping equipment. The HCPSL Board decided to purchase a DualEm unit to allow soils to be mapped in the district. The unit arrived in early 2017.
- HCPSL continued to fund and operate the Herbert Community Basestation network with over 250 GPS users now accessing the signal provided.
- HCPSL and Miriwinni Lime staff worked together to undertake the first variable rate lime application in the Herbert. The trial was done on Renzo and Lawrence Di Bella's farm at Foresthome. Soil tests, yield and soils maps were used to define the management zones within the field. This trial was a proof of concept trial, to investigate if variable rate maps could be developed and shared between HCPSL agronomists and the lime applicator. It is proposed to roll out the practice of variable rate soil amendments to the Herbert industry in coming years.

Harvest management and systems

- Continued work between HCPSL, Wilmar and SRA to investigate harvesting losses and associated issues concerning harvesting and transport.
- Continued support of data management to ensure accurate cane consignment and the analysis of data to base decisions upon.

Youth development

- Support and coordination of the young farmer group.
- Financial support to the under 18 section of the Ingham Show cane display.
- Attendance at the Hinchinbrook Shire Careers Day which was held at Tyto.

Environment and sustainability

HCPSL was involved with the following environment and sustainability focussed projects -

- The Queensland Government funded Project NEMO. This project works with growers through farm demonstration plots to investigate farming systems and fertiliser products that could lead to improvements in water quality outcomes, while remaining profitable.
- The Terrain NRM funded Wet Tropics Sugar Industry Partnership (WTSIP) program to deliver targeted training and extension for growers across the Wet Tropics region.
- The Queensland Government and HCPSL water quality monitoring project. The data from this project is used to inform growers of their environmental impacts.
- The Herbert Demonstration Farm Project. This project assessed the impact of enhanced efficiency nitrogen products in the field and in a glasshouse experiment.

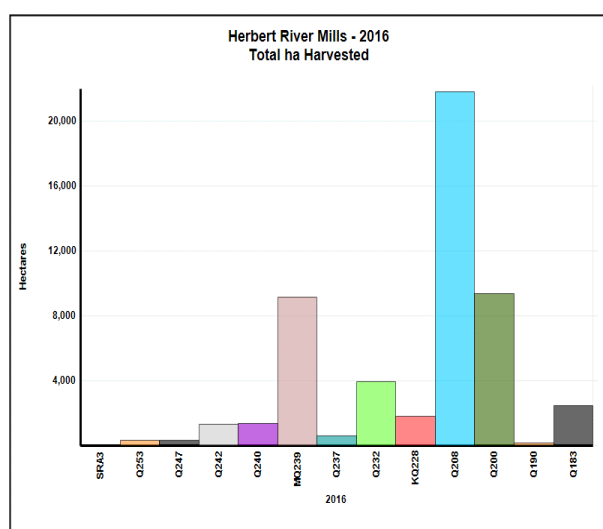
Ash Benson Retirement

July 2016 saw Ash Benson retire to play more golf and spend more time with family. We would like to thank Ash for his commitment to work, his friendship, mentoring of junior staff and knowledge over the years.

The HCPSL Board and staff would like to sincerely thank its members for their continued support in 2016 and look forward to providing a high-quality service again in 2017.

VARIETY PERFORMANCE & RECOMMENDATIONS

In the Herbert District, area under production of Q208[Ⓛ] has increased to approximately 38.9% of the district, compared to 2015. Q232[Ⓛ] has also increased its area up to 7%, whilst MQ239[Ⓛ] has remained constant at around 16% districtwide. Q200[Ⓛ] has shown the greatest decline districtwide, decreasing to 16% from 21% in 2015. This is thought to be a result of a gradual increase in adoption of the recently released varieties. SRA3[Ⓛ] had some significantly variable outcomes in 2016. This variety proved to be a “challenging” variety for some growers and a “god send” for others. Some of the challenges were its reaction to 2,4-D, causing the crop to crank handle. Heavy smut infections were also an issue in some areas. On a positive note, it was one of the top performers for TCH and TSH (based on limited data). There were observations of Brown Rust occurring in Q253[Ⓛ] and Q226[Ⓛ] around the District, although the crops have been observed to make a full recovery, unlike an Orange Rust Infection.



Note – This information has been compiled using limited data for SRA5[Ⓛ], SRA3[Ⓛ], Q253[Ⓛ], Q252[Ⓛ], Q250[Ⓛ], Q247[Ⓛ], Q242[Ⓛ], Q240[Ⓛ], MQ239[Ⓛ], Q238[Ⓛ], Q237[Ⓛ], Q232[Ⓛ], Q226[Ⓛ].

2016 RELEASE VARIETY SRA5[Ⓛ]

Parentage H72-8597 X QN89-109

Clone Name QN04-668

In appearance, it has “light-green to green” large thick stalks, which can turn a light purple colour when exposed. This is a vigorous variety with good ratooning potential when grown in harsh environments. It has been observed to produce moderate - high cane yields in any environment, although low CCS on good growing conditions. The best CCS levels were recorded mid –late season. SRA5[Ⓛ] grows quite tall, although we don’t expect early lodging to be a problem as it survived Cyclone’s Yasi and Ita in the FAT trials. SRA5[Ⓛ] is rated **Resistant** – Red Rot and Brown Rust, **Intermediate** - Pachymetra, Smut, Leaf Scald, Orange Rust and RSD. This variety is only recommended for extreme wet and dry environments where other varieties struggle to grow.

Herbert Recommended Varieties x Soil Type			
Dry Zone		Wet Zone	
Terrace Loamy Soils	Q200 [Ⓛ] , Q247 [Ⓛ] , Q208 [Ⓛ] , SRA3 [Ⓛ] , SRA5 [Ⓛ] , Q238 [Ⓛ] , Q240 [Ⓛ] , Q242 [Ⓛ]	Alluvial Soils	Q238 [Ⓛ] , Q200 [Ⓛ] , Q208 [Ⓛ] , SRA3 [Ⓛ] , Q237 [Ⓛ] , Q240 [Ⓛ] , Q247 [Ⓛ] , Q250 [Ⓛ]
	Q200 [Ⓛ] , Q208 [Ⓛ] , Q242 [Ⓛ] , Q232 [Ⓛ] , Q226 [Ⓛ] , SRA5 [Ⓛ] , SRA3 [Ⓛ] , Q253 [Ⓛ]		Q242 [Ⓛ] , Q200 [Ⓛ] , Q208 [Ⓛ] , SRA3 [Ⓛ] , Q237 [Ⓛ] , Q240 [Ⓛ] , Q238 [Ⓛ] , Q250 [Ⓛ]
Clay Soils	Q208 [Ⓛ] , Q238 [Ⓛ] , Q226 [Ⓛ] , Q200 [Ⓛ] , Q242 [Ⓛ] , Q253 [Ⓛ] , SRA3 [Ⓛ] , SRA5 [Ⓛ]	Terrace Loamy Soils	Q242 [Ⓛ] , Q237 [Ⓛ] , Q200 [Ⓛ] , SRA5 [Ⓛ] , Q208 [Ⓛ] , Q240 [Ⓛ] , Q232 [Ⓛ] , SRA3 [Ⓛ]
Sandy Soils	Q208 [Ⓛ] , Q247 [Ⓛ] , SRA5 [Ⓛ] , Q232 [Ⓛ] , Q238 [Ⓛ] , Q242 [Ⓛ] , Q253 [Ⓛ] , SRA3 [Ⓛ]		Q200 [Ⓛ] , Q240 [Ⓛ] , Q232 [Ⓛ] , SRA3 [Ⓛ]
Hill Slope Soils		Clay Soils	Q200 [Ⓛ] , Q240 [Ⓛ] , Q183 [Ⓛ] , SRA3 [Ⓛ] , Q208 [Ⓛ] , SRA5 [Ⓛ] , Q242 [Ⓛ] , Q253 [Ⓛ]
Varieties Displaying Tolerance of Sodic Soils		Q138, Q215 [Ⓛ] , Q226 [Ⓛ]	

DISEASE RATINGS FOR RECOMMENDED VARIETIES IN THE HERBERT

	Brown rust	Chlorotic streak	Leaf scald	Orange rust	Pachymetra root rot	RSD	Red rot	Smut	Yellow spot	
Q183 [Ⓛ]	Resistant	Resistant	Intermediate	Resistant	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Q183 [Ⓛ]
Q200 [Ⓛ]	Resistant	Resistant	Intermediate	Resistant	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Q200 [Ⓛ]
Q208 [Ⓛ]	Resistant	Resistant	Intermediate	Resistant	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Q208 [Ⓛ]
Q215 [Ⓛ]	Resistant	Resistant	Intermediate	Resistant	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Q215 [Ⓛ]
Q190 [Ⓛ]	Resistant	Resistant	Intermediate	Resistant	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Q190 [Ⓛ]
Q226 [Ⓛ]	Resistant	Resistant	Intermediate	Resistant	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Q226 [Ⓛ]
KQ228 [Ⓛ]	Resistant	Resistant	Intermediate	Resistant	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	KQ228 [Ⓛ]
Q231 [Ⓛ]	Resistant	Resistant	Intermediate	Resistant	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Q231 [Ⓛ]
Q232 [Ⓛ]	Resistant	Resistant	Intermediate	Resistant	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Q232 [Ⓛ]
Q237 [Ⓛ]	Resistant	Resistant	Intermediate	Resistant	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Q237 [Ⓛ]
Q238 [Ⓛ]	Resistant	Resistant	Intermediate	Resistant	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Q238 [Ⓛ]
MQ239 [Ⓛ]	Resistant	Resistant	Intermediate	Resistant	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	MQ239 [Ⓛ]
Q240 [Ⓛ]	Resistant	Resistant	Intermediate	Resistant	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Q240 [Ⓛ]
Q242 [Ⓛ]	Resistant	Resistant	Intermediate	Resistant	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Q242 [Ⓛ]
Q247 [Ⓛ]	Resistant	Resistant	Intermediate	Resistant	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Q247 [Ⓛ]
Q250 [Ⓛ]	Resistant	Resistant	Intermediate	Resistant	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Q250 [Ⓛ]
Q253 [Ⓛ]	Resistant	Resistant	Intermediate	Resistant	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	Q253 [Ⓛ]
SRA3 [Ⓛ]	Resistant	Resistant	Intermediate	Resistant	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	SRA3 [Ⓛ]
SRA5 [Ⓛ]	Resistant	Resistant	Intermediate	Resistant	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate	SRA5 [Ⓛ]

= Resistant
 = Intermediate
 = Susceptible
 = Unknown/In Trial

VARIETY PERFORMANCE & RECOMMENDATIONS

QCANESelect™

Selecting the best variety can significantly influence yields for a whole crop cycle but requires growers to consider many complex factors. After a variety has been released, data becomes available on its performance in different soil types, crop classes, productivity zones and seasons.

QCANESelect™, (<http://tools.sugarresearch.com.au/QCANESelect/>) incorporating mill data, can provide growers with up-to-date variety information to assist them to make the complex decisions involved in optimising variety composition on their farm. Users have a choice of logging in as *guest users* who only have access to Variety Information and On-line Resources and *registered users* (password access) who can access all modules, system keeps records of past recommendations and plans.

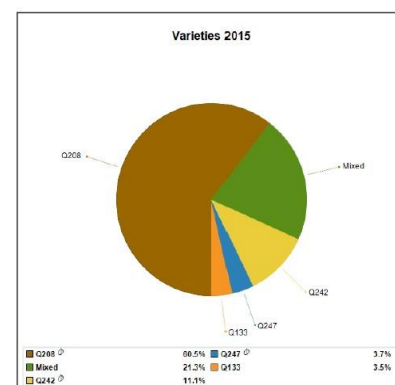
In QCANESelect™ growers can define the soil type, diseases of concern and management options and get recommendations for an individual block or for their whole farm. In the 2016 season, approximately 20% of Herbert growers (by area) were invited to participate in a pilot program for the Whole of Farm Planning module.

The following graphs are an example of some of the information that is available in a Whole of Farm Plan (WOF) for “Farmer Joe Farm number 6249A”. This is based on real data, although the Contact Name and Farm Number are fictitious for privacy reasons. “Farmer Joe” has only one farm and this is in the Ingham Line district. He wants to plant a variety in a clay block that is good for mid-season sugar. The graphs opposite show seasonal CCS, cane yield and sugar yield trends for the Ingham Line district by major varieties for 2015. Examination of these trends will assist “Farmer Joe” in deciding what variety to plant. Q208^{db} had CCS levels above mill average for most of 2015 season although Q240^{db} had the highest sugar yield of the selected varieties. “Farmer Joe” wants a variety that performs in his area as well as a variety that is resistant to smut and resistant/ intermediate to *Pachymetra* root rot. He only recently purchased his farm on which the previous owner originally planted a lot of Q208^{db}. “Farmer Joe” wants to change the variety and crop class make-up of his farm, but even after selecting Q200^{db} to plant in his fallow block, he has 67% of Q208^{db}. The use of QCANESelect™ will assist him to plan, manage and implement his new variety program, which will help to minimise the risk of disease and improve his productivity.

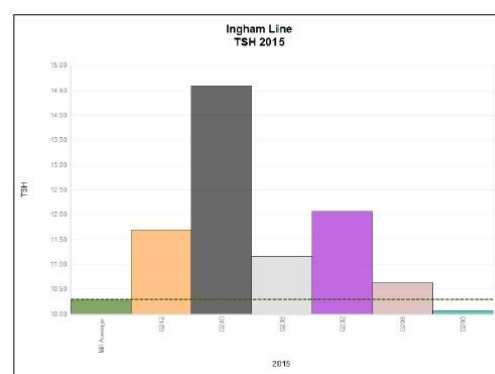
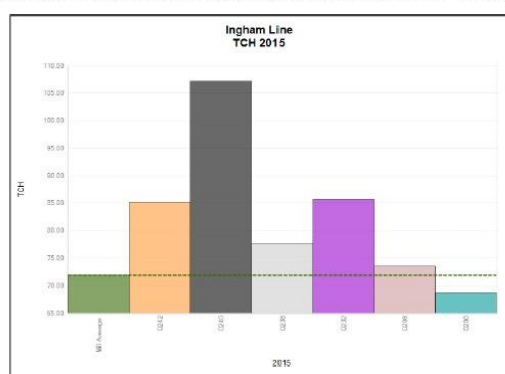
Many useful comments were obtained in the pilot program and, due to the enthusiastic response, this program will be expanded in 2017. The Farm Planning process has also allowed growers to obtain Approved Seed cane in 2016, to ensure that they have the appropriate varieties for future plantings. It is anticipated this level of management and planning will enable growers to plant the most appropriate variety on a block, leading to improvements in productivity in the future. Growers who are interested in participating in the 2017 program can contact Sam Sellick (HCPSL) on 0417622129 or Jo Stringer (SRA) on 0408011205.

Recommendations	1st	2nd	3rd	4th
Variety	Q200 ^{db}	Q208 ^{db}	Q232 ^{db}	Q253 ^{db}
Select for Planting	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Smut	Resistant	Intermediate - Resistant	Resistant	Resistant
Pachymetra	Intermediate	Intermediate	Intermediate	Resistant
Mid Sugar	Good	Good	Average	Average
One Variety Maximum 35%	16% ✓	67% ✗	16% ✓	16% ✓
Include in Comparison Report	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Variety Links	Links	Links	Links	

	5th	6th	7th	8th
Variety	Q226 ^{db}	Q183 ^{db}	Q240 ^{db}	SRA3 ^{db}
Select for Planting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Smut	Resistant	Intermediate - Resistant	Resistant	Intermediate
Pachymetra	Intermediate - Resistant	Resistant	Intermediate	Intermediate - Susceptible
Mid Sugar	Average	Good	Good	Average
One Variety Maximum 35%	16% ✓	16% ✓	16% ✓	16% ✓
Include in Comparison Report	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Variety Links	Links	Links	Links	



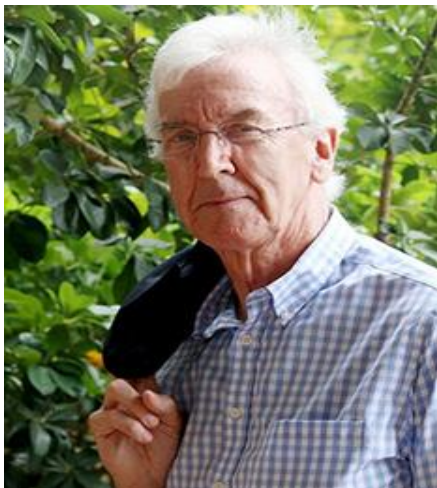
This information has been compiled using limited data for Q232^{db}, Q253^{db}, Q226^{db}, Q240^{db}, SRA3^{db}



VISITORS TO THE HERBERT

During 2016 the Herbert cane industry received the following delegations to view our industry practices first hand -

- Early September - A delegation of Brazilian industry representatives lead by Case IH, to look at farming operations in the Australian industry.
- Early September - Phnom Penh Sugar and the LYP Group companies, reviewed farming operations and machinery, in the Herbert region. Following the visit to Australia, Dr. Andrew Wood and Ash Benson undertook a follow up visit to Cambodia.
- Mid-September - A delegation from the Vietnam sugarcane industry visited to investigate opportunities to improve crop agronomy practices (especially in the field of crop nutrition).
- Dr Geoff Garrett AO, Office of the Queensland Chief Scientist, visited the district mid-year and then for the HCPSSL AGM in October. Dr. Geoff Garrett visited research trials in the district that were associated with managing water quality entering the Great Barrier Reef.



Dr Geoff Garrett AO



Young Grower of the Year – Adrian Covell



Lifetime Achievement Award – Bert Bonassi



Lifetime Achievement Award – Josie Vecchio

2015 HERBERT SUGAR INDUSTRY AWARDS

Award	Recipient
Grower of the Year (Sponsored by HCPSSL)	Alan Lynn
Young Grower of the Year (Sponsored by QSL)	Adrian Covell
Mangrove Jack Award (Sponsored by Herbert River Catchment Group)	Sam & Santo Lamari
QMCHA Harvesting Efficiency Award	SJC Harvesting (Chiesa)
Innovation Award (Sponsored by Rabobank)	Remo & Gino Zatta
Farm Presentation Award (Sponsored by CAMECO)	Chris Bosworth
Improved Farm Layout Award (Sponsored by Canegrowers Herbert River)	JMAK Farming (Jason Aili)
Consistent High Productivity (Sponsored by QSL)	JM DB & JD Mahony J C M K & TP Pedruzzi Joe Minato Steven & Anthony Castorina Vince Russo Errol Cantamessa
R&D On-farm Co-operation (Sponsored by HCPSSL)	Stephen & Brendan Accornero Alan Robino Errol Cantamessa Reinaudo Farming
Lifetime Achievement Award (Sponsored by HCPSSL)	Josie Vecchio Bert Bonassi Ash Benson



Lifetime Achievement Award – Ash Benson



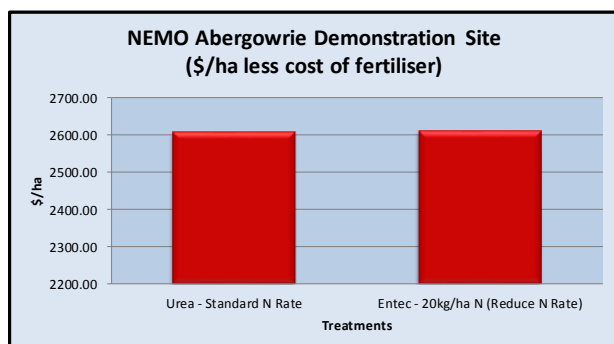
Australian Government



Queensland Government

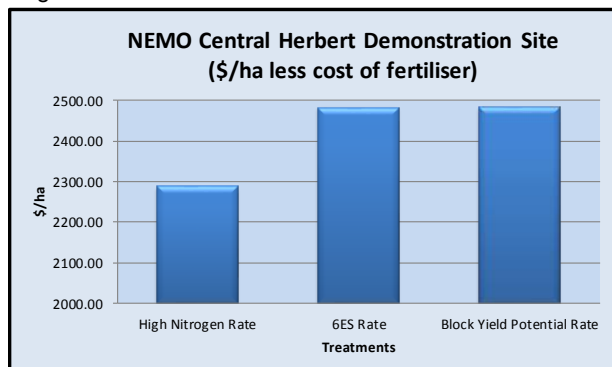
PROJECT NEMO

Project NEMO (Nitrogen Efficiency Management On-farm) is into its third year with several demonstration sites receiving their second set of harvest results. Once again, drier than normal conditions in the first half of 2016 resulted in a limited number of nitrogen loss events. Despite this, responses to enhanced efficiency fertilisers and different rates of nitrogen were still evident at several sites, particularly from an economic perspective. The Abergowrie demonstration site has shown that from an economic point of view, even in a relatively dry year, the Entec® product has performed just as well as the standard urea product, despite a reduction of 20kg/ha of nitrogen.



What has also been evident across some sites has been the performance of the six easy steps (6ES) rate of fertiliser when compared to higher applications of nitrogen.

The Central Herbert demonstration site has shown that by following the 6ES (or the block yield potential) recommended rate for nitrogen, as well as other crop nutrient requirements, the economic return was almost \$200/ha better than the high nitrogen rate.



THE HERBERT SUSTAINABLE FARMING SYSTEMS GROUP (HSFSG)

The Herbert sustainable farming group met only once in 2016 due to the late finish to the crush. A sustainable farming forum and field tour was organised on the 5th May and included a special presentation on soil microbiology by guest speaker Professor Susanne Schmidt from the University of Queensland.

Thirty-three growers and industry representatives from the Herbert and across North Queensland attended to listen to Professor Schmidt's presentation before seeing first-hand the work being carried out in the Herbert from projects and field trials including -

- Legume nitrogen management project (Stone River)
- Companion planting with sugarcane project (Abergowrie)

- Project NEMO - Enhanced efficiency fertiliser demonstrations (Central Herbert)
- Mill mud and ash application and water quality trials (Ingham Line)



Mill Mud Trial on Wilmar Farm at the Orient

ENHANCED EFFICIENCY FERTILISER TRIAL - A GLASSHOUSE EXPERIMENT CONDUCTED AT THE HCPSL MACKNADE SITE

Nitrogen (N) loss is an important issue for the sugarcane industry in tropical Australia because of offsite environmental impacts. Enhanced Efficiency Fertilisers (EEFs) have the potential to reduce nutrient losses leading to improvements in nutrient uptake efficiency, productivity gains and improved environmental outcomes.

A glasshouse experiment compared N lost in drainage and as nitrous oxide for conventional urea, AgroMaster® (polymer coated urea) and Entec® (urea treated with DMPP) fertilisers applied at a rate equivalent to 100 kg/ha of N. This trial was funded by the Queensland Government's Paddock to Reef program and conducted by HCPSL.

Loss of N in leachate at day 50 for PCU was approximately half that of urea and DMPP, which were similar (28 mg/pot). Most of the N was leached as NO_x-N (>77%) at both day 50 and 150, when losses were low and similar for all treatments (<2.4 mg/pot). Both enhanced efficiency fertilisers were effective at reducing loss of N as N₂O at 50 days after fertiliser application. Loss for DMPP was only 18% of the loss with urea and PCU loss was 62% of that with urea. However, the maximum daily loss of N as N₂O of 0.04 mg/pot/day at day 50, was very low in comparison to that lost in leachate (28 mg/pot) at the same time.

These results provide options for the selection of EEF based on anticipated loss pathway for a combination of soil types, position in landscape, and seasonal weather outlook. PCU, or a blend with urea, would be the preferred N fertiliser for well drained sites in higher rainfall areas where rate of leaching is expected to be high. Loss of N in leachate for PCU was only 46% of the loss for urea at day 50. DMPP, or a blend with urea, would be the preferred N fertiliser for poorly drained sites in wet areas or for prolonged wet growing conditions where rate of N₂O emission is expected to be high.

Rural R&D for Profit

A \$5.5 million investment in a holistic approach to improving mechanical harvesting

A collaborative adoption program to facilitate profitable changes in practice

Extensive trials

R&D-based modifications to mechanical harvesting and new technology to improve in-field performance

Software to improve farm and block specific harvesting practices

Value chain modelling and economic analysis



Australian Government
Department of Agriculture
and Water Resources



Sugar Research
Australia™

Rural R&D for Profit

Enhancing the sugar industry value chain by addressing mechanical harvest losses through research, technology, and adoption

This major integrated research project is linking new research into harvesting efficiency with a major program of adoption to optimise the harvest across the industry. Project collaborators include the Queensland University of Technology, the Queensland Department of Agriculture and Fisheries, Norris ECT, Agtrix and sugar milling companies. Across the project, investment includes \$3.55M from the Commonwealth and \$1.85M from SRA, with additional contributions from the other collaborators.

There is good evidence that, since mechanical harvesting began, significant losses of cane have been occurring and that the level of loss has increased over the years. The extent of these losses is variable and they can be excessive. Incremental losses at successive stations in the harvester add up to significant impacts on overall profitability.

This program comprises a suite of projects that address loss mechanisms, improve information for harvester operators in the field and work with industry practice to unlock significant increased value through reducing losses.

Research and adoption components of the project:

- Development of an on-line tool to provide operators with real-time feedback on harvesting practices to maximise industry profitability
- Understanding the operation of harvester basecutters and spirals to ensure minimal damage to the cane plant and full integration with the feed train and choppers
- Commercial-scale economic evaluation of field-side cane cleaning, including the impacts of clean cane on milling
- Sensors for improving harvester feedback: a feasibility study
- An industry-wide adoption project to facilitate profitable changes to harvester practice

Adoption:

The adoption project will recruit willing harvester groups (a harvester operator and the farmers contracted) to participate in collaborative trials and workshops.

Field teams will conduct demonstration trials on losses for each group.

The groups will then be invited to facilitated workshops, led by SRA Adoption Officers, to review the results of the trials and discuss possible responses.

These will be tailored to each group and could include changed payment arrangements, or harvester monitoring.

The project will target approximately 10% of harvester groups in 2017 and another 10% in 2018.

HERBERT PLANT BREEDING & SELECTION PROGRAM UPDATE

The 2016 harvest season was a challenging one for all of the Herbert region with rain interruptions and delays in plantings. The Herbert selection program was not immune to these challenges. Despite this, all trials and propagations were successfully planted and harvested in 2016, a big feat given the expansion in plant breeding activities. The Herbert Plant Breeding Team is still committed to the expansion of the Herbert selection program, as they continue to implement the recommendations of the recent Herbert Breeding Program Review. New Herbert plant breeding activities conducted in 2016 as part of this enhanced program include -

- Introduction of 485 clones from Meringa, 8 clones from the Burdekin, and 35 clones from the Central, Southern and New South Wales Selection Programs sent via SRA's Domestic Quarantine Facilities in Indooroopilly
- Introduction of 15 Foreign clones (from USA, Barbados, Guatemala, Colombia and Reunion) propagated using Tissue Culture from SRA's International Quarantine Facilities in Indooroopilly

This means a total of 543 clones were propagated in the Herbert in 2016 to provide planting material to establish the first Herbert CAT in 2017, and assess these clones under Herbert growing conditions. Their performance in the Herbert will be eagerly monitored.

A recent Pachymetra survey conducted by HCPSL has highlighted that Pachymetra is still a disease of concern, especially as it is not a visible disease like Smut or many leave diseases so it is often forgotten. The Plant Breeding Team is also committed to improving the level of Pachymetra resistance of clones in the Northern and Herbert programs, with at least 50% of the seedlings planted to the field each year since 2010 coming from Pachymetra-resistant crosses (where both female and male parents are resistant to Pachymetra), and none from susceptible crosses. These clones will start to make their way into Herbert FATs and the Tully Pachymetra trials this year. As a result of the change in how we select seed for the Herbert, we anticipate that the proportion of Pachymetra-resistant clones tested in the Herbert FATs will increase from this year, so watch this space.

Staff changes and new faces

Not only did we have changes in the Herbert selection program in 2016, but we had some staff changes as well. In September 2016 we said goodbye to Heidi Clements after 9 years as Variety Officer in the Herbert. She has found a new career as an Assistant Breeder with CSIRO in their Cotton Breeding Program in Narrabri. Melanie Adams (previously appointed as the Herbert CAT Technician) was appointed as the new Herbert Variety Officer and has happily jumped in feet-first into her new role. We also have a new face in the Herbert Plant Breeding Team, Laura McIntosh, who will be responsible for the new CATs we are establishing, as well as assisting in other aspects of the plant breeding program.

The SRA Plant Breeding Program has also undergone some changes in 2017 after the KFA1 leader Dr Bert Collard implemented a minor restructure of the breeding team. Dr Fengduo Hu will lead the Herbert Selection Program, ably supported by Melanie Adams and Laura McIntosh. Dr Hu will also establish the core Introgression pipeline. This new structure exploits the co-location of Introgression trials in the Herbert region, and builds on well-established linkages with the industry. Dr Felicity Atkin will continue to be involved in the Herbert program, as the majority of the Herbert CAT clones will continue to originate from the Northern Selection Program, but will no longer lead day-to-day operations in the Herbert. Dr Atkin will continue to focus on leading the Northern Selection and Crossing Programs, and will be responsible for implementing new genomic prediction technologies into the crossing program.

HERBERT RATOONING VARIETY TRIALS (RVT'S)

Herbert Ratooning Variety Trials are conducted by a combined effort from SRA and HCPSL. These trials were introduced into the area after a review of the Herbert Plant Breeding Programme, when concerns were raised regarding varietal performance in problematic soil types. The RVT's allow us to survey which of the up and coming varieties will grow in these areas as well as monitoring the ratoonability under commercial harvesting conditions.

The first of the RVT's were planted in 2013. Below is a quick review of where we are up to with the trials and what soil types we have targeted.

2013 - 2 Trials planted - 1 in a dry clay block at Helens Hill and the 2nd in a wet clay block at Seymour.

2014 - 2 Trials planted - 1 in a wet clay block in the Trebonne area and the 2nd in a sandy block at Stone River.

2015 - 2 Trials planted - 1 in a heavy clay block at Blackrock and the 2nd in a sandy block at Abergowrie.

2016 - 2 Trials planted - 1 in heavy clay soil at Hawkins Creek and the 2nd in clay soil at Bambaroo.

Approximately 20 of the top performing varieties from the FAT's are put into the trials along with some standard varieties that suit the soil type, to compare against. Each block is monitored for -

- Germination Ratings
- Disease Inspections
- Stalk Counts
- CCS Curves (Samples are taken throughout the year for the plant blocks)
- In a Plant & 1st Ratoon block, weights and CCS are taken for each variety, by getting a 10 stalk sample, weighing and then putting through the small mill.
- From a 2nd ratoon block, weights are collected with the use of a weigh tipper and CCS is determined by a sub sample being taken and put through "Spectra Can".
-

All of this data is then collected and used to assist with the recommendation and approval process of varieties for the area.



A trailer of cane ready to be planted into a Variety Trial



The Herbert River Catchment Landcare Group partook in the following activities in 2016 -

- Continued riparian revegetation and weed control in the Palm Creek system.
- Continued involvement in the Hinchinbrook Community Feral Pig Management Program.
- Continued management of the Insulator Creek stream bank stabilization and revegetation project.
- Continued support for the Herbert Water Quality Monitoring Program.
- Continued support for the eradication of Candlenut bush, Singapore Daisy, Siam weed, Hymenachne and Pond Apple in the Hinchinbrook Shire.
- Continued management of aquatic weeds in the Cattle Creek area adjacent to the Bruce Highway.
- Involvement in the Catchment prioritisation process managed by Terrain NRM and State Government.
- Conducted a pest and weed control workshop for graziers and canefarmers at the Stone River CWA Hall, on the 20th of May. The workshop discussed Nauva Sedge, Wynn Cassia and Feral pig management. Dr. Victor Galea (from the University of Queensland) also showcased a new bio-herbicide being assessed for the management of lantana and Parkinsonia. There were also opportunities for participants to view first hand spray technologies and techniques to manage weeds in grazing land. The workshop was well attended with 45 participants attending.

The annual Herbert River Catchment Landcare Group AGM was this year held at Ravenshoe and was hosted by the Upper Herbert sub-group in October. The guest speaker from Biosecurity Queensland discussed the issues concerning the management of Siam weed throughout the whole catchment area.

The Lower Herbert sub-group held a membership drive on the 9th of May, with a number of new members joining up, while the Upper Herbert sub-group is finding it difficult to maintain numbers. The Herbert River Catchment Landcare Group is always seeking new members. Please do not hesitate to contact Lawrence Di Bella on 47761808 or Peter Sheedy on 47765350 if you are interested in being involved in Landcare.



Landcare Project works at Insulator Creek

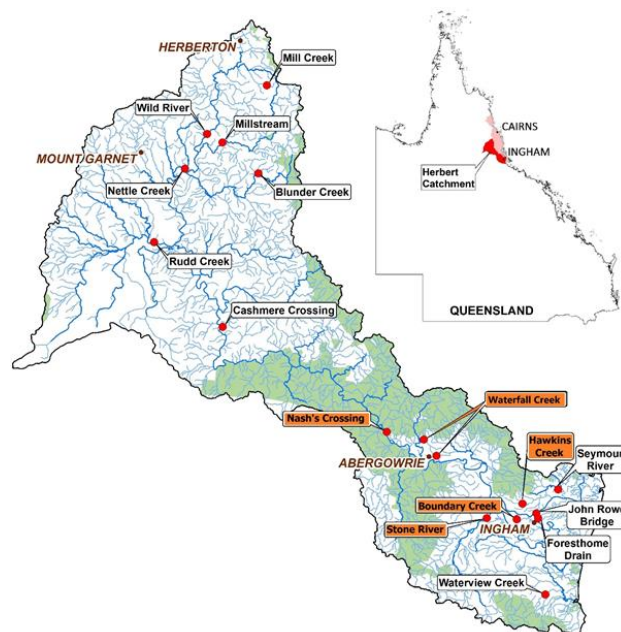
HERBERT WATER QUALITY MONITORING PROGRAM

The Herbert Water Quality Monitoring Program (HWQMP) commenced in July 2011 and operated for 3 years to monitor water quality for the whole Herbert Catchment area before being extended under the "HWQMP – Extension" to monitor known hotspots and the effectiveness of targeted extension programs delivered by industry.

This project was initiated and funded by HCPSSL with support from Terrain, the Department of Science, Industry, Technology and Innovation (DSITI), TropWATER, Hinchinbrook Shire Council and now the Department of Environment and Heritage Protection (DEHP). The HWQMP monitors sediment, nutrient and pesticide concentrations in surface waters collected from various sub-catchments to capture any changes from the levels measured in the previous 2011-2014 HWQMP program. With funding secured until June 2018, Project NEMO and the HWQMP extension initiatives will build industry knowledge on extension strategies that lead to practice change adoption and WQ outcomes in known hotspots within the Herbert sugarcane growing district.

In 2014-16, water samples were collected from 5 sites including two dedicated sugarcane sub-catchments, which are the focus of a targeted extension program (Project NEMO) looking at nitrogen and pesticides losses. These results indicate that although there has been some shift in the way Herbert sugarcane growers have applied their fertiliser, seasonal drivers such as rainfall still have the greatest effect on nitrogen losses.

In relation to chemical use, there has been some improvements in the use of some chemical constituents, but the off-label use of other chemicals has also been identified and subsequently addressed by the HCPSSL, demonstrating the value of consistent WQ monitoring at high risk sites.



A map of the Herbert catchment showing all previous HWQMP sampling points. Note the five current sampling points highlighted in orange used to monitor previously identified hotspots.

HERBERT MICROBES TRIAL



In 2014, growers Ian Kemp and Alan Robino, on behalf of the Ingham Soil Health Group, approached HCPSL seeking assistance in trialling microbial products that claim to promote improved soil health. Partnering with Terrain NRM and the University of Qld microbiologist Dr Susanne Schmidt, a trial was established on the Robino farm to assess whether the microbial products Soil Life® and Platform® could -

1. Improve productivity and/or profitability in a sugarcane production system.
2. Improve productivity and/or profitability in a sugarcane production system with a reduction in applied nitrogen (N).
3. Influence physical and bio-physical factors associated with soil and plant.

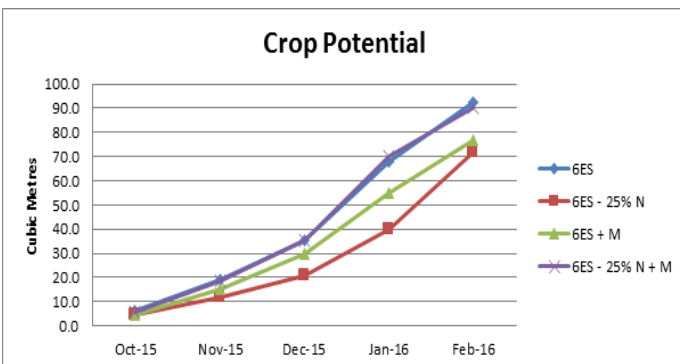
Analysis and assessment of the trial included -

- Above-ground plant biomass & crop yield
- Crop nutrient uptake
- Soil structure & microbial activity

The trial was completed in 2016 with the following conclusions -

- Soil Life® and Platform® resulted in no significant improvement in crop productivity, both at the six easy steps or the reduced N rates.
- Applying 25% less N than recommended by Six Easy Steps produced similar crop productivity.
- While some changes in soil biology were detected after the application of the microbial products, any effects (beneficial or negative) were not able to be concluded.

The results and the processes involved in assessing Platform® and Soil Life® suggest that there are still numerous unanswered questions that may warrant further investigation. Further questions were also raised over the issues surrounding the currently unregulated crop pro-biotic industry.



Early crop growth measurements showed trends towards some treatments however by end of crop there was no significant differences



Grower Alan Robino and HCPSL Extension agronomist Adam Royle discussing results of the Herbert microbe trial with visiting growers.

SUGARCANE AND LEGUME COMPANION PLANTING PROJECT

As a part of a state-wide project, a trial was established on the Accornero farm in the Abergowrie area to assess crop productivity benefits and nitrous oxide (N₂O) emissions by supplementing crop N needs with biologically fixed N from companion planted legumes (soybean & mungbean).

Treatments included -

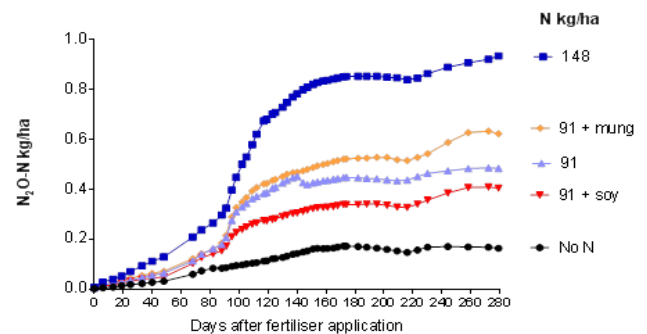
- Full N rate (148kg/ha N; no legumes)
- Reduce N rate (91kg/ha N; with and without legumes)
- Low rate of N (66kg/ha N; with legumes)
- Zero N rate (no legume)

The legumes were planted on the edge of the row in a ratoon block of KQ228 just before out of hand stage and several weeks after fertiliser was applied.

Results

N₂O Emissions

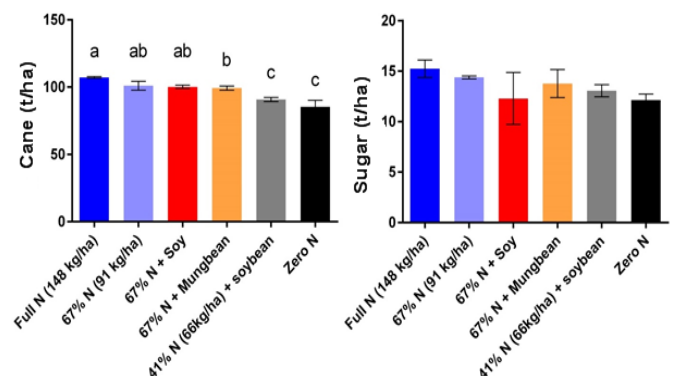
The amount of N fertiliser applied was the main driver in N₂O emissions. A 50% - 70% reduction in N₂O was achieved in the reduced N treatments regardless of whether there was a legume planted; when compared to the full N rate.



Nitrous oxide emissions at different N rates captured at the Abergowrie companion planting trial (2014-15)

Crop Yield

Sugarcane crop yields were highest in the full N rate, the reduced N rate, and reduced N rate + soybeans. The reduced N rate + mungbeans yielded lower again but not as low as the low rate of N + legumes or the zero N rate, which was significantly lower in yield than all other treatments.



Yield and CCS results from the final harvest of the Abergowrie companion planting trial.

INTROGRESSION

The genetic base of commercial sugarcane varieties in Australia is narrow, and there is concern that the current suite of varieties do not perform or ratoon well under harsh and stressful environments. Introgression of wild sugarcane relatives will increase the diversity in genetic background and reduce the risks associated with the current narrow genetic base.

Thanks to SRA, HCPSSL, Wilmar, MAPS, ISIS Productivity, NSW Sugar and QDAF, this Introgression Project started in 2014, with trial planting occurring across Qld and NSW in 2015. This is also a part of the Plant Breeding Program put into place to assist in the selection of varieties for all regions.

Project aims are -

- Identify & exploit new sources of genes for better ratooning, resistance to Nematodes & Pachymetra Root Rot
- Identify clones that were resistant to nematodes in controlled-environment screening test in field-based trials
- Select clones with higher yield and ratooning ability under harsh conditions.

The major outcome of this work is to improve productivity and sustainability of the sugarcane industry. Varieties developed from introgression material will be taken up immediately at no extra cost to growers or millers. There are currently six trials in the Herbert region, in which four trials were planted in 2015 and two trials in 2016.

Four trials planted in 2015 –

- Yield trial (VIC15-61) planted in high Pachymetra site, located around Helens Hill (Russo)
- Yield trial (VIC15-62) planted in low Pachymetra site, located at the SRA Ingham station farm
- Root Lesion Nematode trial (VIC15-63), located at Abergowrie
- Large seedling trial (VIC15-64, 140 families), located at the Macknade HCPSSL farm

All four trials were harvested in 2016 with the results currently being analysed. Raw data for top performing clones for plant crop is shown in the following table. It is planned to harvest all six ratoons crops in 2017.

Two trials planted in 2016 –

- Slash trial (VIC16-62, reducing selection time), located at the SRA Ingham station farm
- Small seedling trial (VIC16-64, 70 families), located at the Macknade HCPSSL farm.

These two trials will be assessed in 2017. In early 2017, selections from the top performing families in the 2015 Seedling trial will be propagated to go into the CAT Program in 2018.

Clone	TCH	CCS	TSH	Trial	Common
QA04-1448	158.95	15.02	23.91	VIC15-61	
KQ08-1040	157.39	14.16	22.26	VIC15-61	
KQB07-23976	174.43	11.84	20.70	VIC15-61	yes
KQB09-23126	155.97	13.28	20.69	VIC15-61	
KQB07-23989	149.58	13.07	19.57	VIC15-61	
Q200	142.95	14.95	21.36	VIC15-61	
Q208	149.53	13.97	20.80	VIC15-61	
Q232	146.31	13.61	19.90	VIC15-61	
Q240	129.55	14.64	19.05	VIC15-61	
SRA6	151.56	14.35	21.80	VIC15-61	
KQ08-1347	128.52	15.82	20.35	VIC15-62	
KQB07-23976	149.58	13.46	19.58	VIC15-62	yes
KQ08-1012	108.96	16.64	18.07	VIC15-62	
Q200	125.66	15.70	19.47	VIC15-62	
Q208	131.22	14.90	18.95	VIC15-62	
Q232	126.63	14.70	18.52	VIC15-62	
Q240	118.64	16.10	18.94	VIC15-62	

Top performing clones VS commercial varieties harvested in 2016



HCPSSL and CANEGROWERS Herbert River have been an integral part of the Wet Tropics Sugar Industry Partnership (WTSIP) since the start in 2014. WTSIP is a cane industry and NRM partnership to deliver water quality, productivity and profitability outcomes in the Wet Tropics. The training and extension focus is on farming practice change and improvement to deliver productivity gains and reduce sediment, nutrient and pesticide loads coming off farmland and into waterways. WTSIP and HCPSSL have been refunded in 2016 through to 2019 with Jarrod Sartor (HCPSSL), Caroline Coppo and Don Pollock, CANEGROWERS Herbert River, based in the Herbert.

HCPSSL, as a training provider (Ash Benson), has delivered 25 WTSIP Integrated Weed Management training workshops to 317 growers across the wet tropics catchments, from Ingham to Mossman and the Tablelands.

Three hundred growers have participated in WTSIP/HCPSSL extension activities in the Herbert. From 2014 to 2016 HCPSSL has held 18 training workshops on nutrient management, integrated weed management, precision agriculture and soil health, with 230 grower attendees. Also in that period 129 Herbert growers commenced or updated Nutrient or Integrated Weed Management farm plans.

WTSIP/HCPSSL are pleased to announce success with farm nutrient management planning with a template which can be consolidated into a realistic and workable whole-of-farm plan, overcoming the problem of a multitude of individual block nutrient management plans. Industry specialists have developed and trialled this improved template which has been well received by growers, making it easier to adopt the SIX EASY STEPS guidelines across their whole farm. The industry is putting more emphasis on Nutrient Management planning. Contact Jarrod Sartor on 0499 034 968 for assistance.

WTSIP is funded through the Australian Government Department of Environment and the QFF Reef Alliance Program with 9 extension staff employed across the wet tropics.

RATOON STUNTING DISEASE (RSD) AND CHLOROTIC STREAK DISEASE (CSD)

The District continues to manage RSD and CSD through the HCPSL Approved Seed Plots, long hot water treatment of cane and plant tissue culture programs. The data below showcases the number of tonnes through these programs over the past 3 years –

Year	Approved Seed	Tissue Culture	Hot Water Treated
2014	1200	200	110
2015	842	3500	93
2016	1200	2500	73

HCPSL staff also undertook over 800 seed inspections for growers prior to planting. During 2016, SRA made a scientific breakthrough finding the causal agent for CSD, being a protozoa. This has been a significant breakthrough in the management and control of this disease. A Landline™ story was aired on ABC TV showcasing the scientific breakthrough and farm management methods to control the disease.

FERAL PIGS

Feral pig numbers continue to remain static and crop damage at historical lows, since the inception of the Hinchinbrook Community Feral Pig Management Program (HCFMP), nine years ago. The HCFMP has been successful in getting numbers of feral pigs down, with near 1000 feral pigs being taken out in 2016. HCFMP was also successful in attracting State Government to manage feral pigs impact on turtle populations along the coast areas and adjacent cane lands within the Hinchinbrook Shire.

CANEGRUBS

The levels of canegrub damage was very low in historical impacted areas like Stone River, Pappin's Road and Abergowrie. This is probably due to the continued use of Imidacloprid in these areas. In 2016 crop damage occurred in the Toobanna, Halifax and Fourmile areas. These areas historically have not been problematic areas in the past. It is recommended that growers implement monitoring activities on farm and implement an Integrated Pest Management program when they have a grub issue.

RATS

Significant damage to the crop was incurred by rats during 2016. The mild winter and lodging of the crop, which in turn allowed weeds to establish in blocks, allowed for rat numbers to increase significantly. It was estimated that approximately \$2.5M was lost by the industry, due to rat damage. HCPSL and CANEGROWERS Brisbane worked with APVMA and Animal Control Technologies Australia (ACTA) in an attempt to register Rattoff™ for aerial application of lodged and standover crops, through helicopters and UAV's. At the time of publication of this report, APVMA were considering a proposal from Industry and ACTA.

YELLOW CANOPY SYNDROME (YCS)

The area impacted by Yellow Canopy Syndrome (YCS) was lower than previous years with the worst impacted sub-districts being Victoria Estate, Macknade, Ripple Creek, Palm Creek,

and along the Herbert River in the Tara, Foresthome, Trebonne and Abergowrie areas. Yield reductions caused by YCS were significant on some farms with some growers recording the lowest crop yields and CCS in history on their own individual farms, once again.

SRA and HCPSL conducted a series of experiments on the HCPSL Stone River farm and in the Palm Creek area. These trials assessed fumigation of soil (using Metham), microbial products, crop sunscreens, soil amendments, differing rates micro and macro nutrients, various bactericides, fungicides and insecticides and insect exclusion netting of the crop against non-treated plots. The Stone River trial showed significant increases in cane yield and suppression of YCS symptoms, in both the neonicotinoid and pyrethroid treatments. This is a significant breakthrough for scientists, providing them a valuable lead in the management of the syndrome.

Burdekin YCS trials (conducted by SRA), have found that crop age and time of harvest is very important to determine what degree a crop will be impacted by YCS. Early established crops generally are less impacted than late established crops. The Stone River trial was established very late in September 2014, allowing researchers to consider responses to insecticide treatments of neonicotinoids and pyrethroid. This is the first trial that has shown a yield response to the application to imidacloprid (anywhere in the State). Growers are requested **not** to apply these insecticides as a treatment for YCS, because of water quality and environmental concerns. The rates and formulations of the imidacloprid assessed, are also either different to commercial formulations available or above legal label rates. The commercial rates used by industry still showed significant effects caused by YCS. All trials were undertaken under strict research protocols and procedures.

SRA pathologists have found some pathogens possibly associated with YCS, but results to date have been inconsistent and need further investigation. During the past 12 months, the researchers have developed sound knowledge associated with the bio-chemical processes associated with YCS. This information will assist researchers better understand the mechanics of YCS and cane growth systems. This research has been led by SRA researchers, with assistance from other agencies. The SRA appointed SRA scientific review panel also concluded that there appears to be a genetic interaction associated with YCS. 2016 has been a good year in relation to scientific knowledge gained in relation to YCS. The causal agent is yet to be found, however there is a glimmer of hope that we are now a step closer to finding a causal agent or developing management tools to better manage YCS.

PACHYMETRA ROOT ROT

Following the HCPSL district wide survey for *Pachymetra* and the extension of results, many growers are now undertaking routine *Pachymetra* testing of soil before planting. This disease is of serious concern to industry and has been directly linked to reduced productivity of some fields, ratoon failure and posing a crop stress, which in turn leads to the crop being more susceptible to YCS. Growers are urged to continue sampling soils for *Pachymetra*, prior to planting. Growers are advised to plant resistant varieties when levels of the disease are found to be high. The only option for controlling *Pachymetra* is the use of resistant varieties.

DATA ANALYSIS AND PRECISION AGRICULTURE

This year HCPSL made several improvements to the GPS base station network. Due to a rapidly increasing number of growers in the Bambaroo area moving to Precision Ag, a GPS review was undertaken. With the assistance of several growers in the area, signal surveys were conducted and subsequently the installation of a new GPS base station in the area was agreed to by the HCPSL Board. Installed in an elevated position, the base now provides improved coverage. Thanks to everyone who helped with the surveys and installation of the equipment.

Other upgrades included a rollout of new "Choke Ring" GPS antennas which come supplied with what is known as a "Snow Dome" – not terribly important in Ingham; maybe it will keep the birds off at least. The new type of antennas will future proof the network as they are capable of receiving all current satellite constellations eg. Galileo (European), BeiDou (Chinese) and QZSS (Japanese). It is also hoped that this new style of antenna will help provide a better and more accurate signal as they are shielded from what is known as multi path interference or reflected signals.

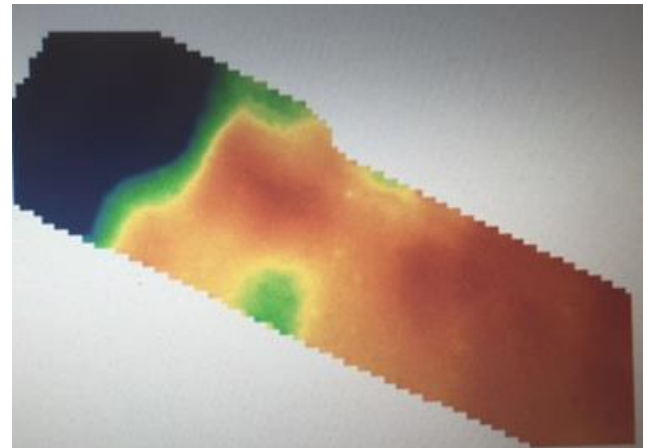
The type of Zonal farming currently undertaken in the Herbert by many growers relies on a highly accurate GPS fix and levels of repeatability. Many forms of broad acre agriculture such as wheat do not require as much precision as Zonal sugar cane growing. Growers need to be aware that on certain days and at certain times of the day, the accuracy even with a fix can vary from +/- two centimetres right out to +/- four centimetres and occasionally worse than this. The screen on your tractor probably shows the level of accuracy you are getting. This year opportunities created by Auto Steer have seen large increases in Zonal tillage and the growers who have decided that mounding may not be suitable, will still benefit from placement and tillage efficiencies and a reduction in compaction.

Some interesting developments in the field of GPS is a new and emerging Japanese satellite constellation called QZSS. The Australian and Japanese governments and Hitachi are working to make the system available to Australian farmers. Trials in Jerilderie and Mackay showed driverless tractors being steered without the need for a base station or radio communication, with correction signals coming from the satellites as opposed to a radio. Expect to hear more about this new opportunity in PA in the next few years. This system is not yet commercially available.

ELECTRICAL CONDUCTIVITY MAPPING

This year we took delivery of a Dual EM 421. Assisted by some funding from Terrain, with our knowledge gained in working with the University of NSW and John Triantafyllis, we were able to justify this tool as part of our business. The device puts a magnetic field through the ground which is then linked to GPS and the return signal measured. Different soils and textures respond in unique ways to these fields and with ground truthing (soil sampling), large areas with similar properties can be established at lower cost than grid soil sampling.

Although it will take some time to understand, the machine offers significant opportunities for Precision Ag. Mapping the soils of CAT and FAT and RVT trials to improve the new variety selection process along with mapping sodic blocks and subsequent variable rate Lime / Gypsum applications are "low hanging fruit" and could provide large and immediate benefits to productivity and research programs.



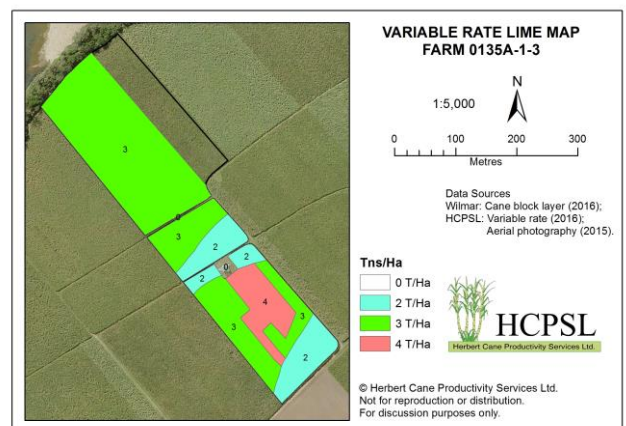
Example of a Dual EM EC Map

This project is well timed to capitalise on another milestone achieved by HCPSL during the year. The proof of concept for variable rate in the field at commercial scale. This followed a meeting with Miriwinni Lime staff where we determined that our GIS system could provide the maps in a format that would go into the variable rate Lime truck.

Subsequently a map was created and variable rate liming of a paddock occurred on Lawrence Di Bella's farm. The process went well and the truck changed rates at nominated zones automatically from an electronic map on a USB drive. Rates varied from 3 tonnes per hectare on poor soils right down to 1 tonne per hectare on the better soils in the block. This exciting new capability along with the arrival of the Dual EM machine and soil testing gives us the tools to address sodic patches and other issues in a precise and scientific manner.



Commissioning the Dual EM



Variable rate map – Farm 0135A-1-3

TESTING THE APPLICATION OF DRONE TECHNOLOGY

Recent years have seen an increase in the use of drone technology in agriculture. Drones, also known as UAVs (unmanned aerial vehicles), or RPAs (remotely piloted aircraft); the definition used by CASA (Civil Aviation Safety Authority) are used to carry various sensor payload to collect aerial data relating to the crop. On 29th September 2016, CASA relaxed the regulations around the use of 'very small' drones (that is, drones between 100g and 2kg maximum takeoff weight), issuing a set of Standard Operating Conditions for their use in commercial activities without the need to get a remote pilot's license (RePL).

Flying under these new regulations, HCPSL has been able to make several flights with a very small drone over a couple of trials on private property to assess the potential value of the imagery acquired. The high resolution aerial imagery from the drone has shown in-block areas with slower cane growth and agrees with electromagnetic conductivity data collected some time later. The visual effects of a current herbicide trial in the same block is also distinguishable. Another flight was undertaken to see the extent of inundation after a rain event in January. In another flight the extent of cane lodging is shown. This data has been presented to the HCPSL Board as part of an assessment of whether HCPSL might find value in the purchase of a drone to complement its work in trials, and pest and weed management among other potential uses.



SST PILOT PROJECT

The SST pilot project continues to move forward. SST's Australian account manager Mark Pawsey recently visited HCPSL and presented many of the updates that have been added to the Sirrus and Summit software packages that are now available to users. SST have addressed many of the needs (for sugar) which were discussed during a staff visit to SST's head office in Stillwater Oklahoma, last year. SST has released a new version of Sirrus which has a dashboard based home page. This allows the user to see the most recent activities and weather. Sirrus also now has an auto-sync function which activates when the device gets into a Wi-Fi connection range.

YIELD MAPPING OUTPUTS AND THE FUTURE

In mid-February, HCPSL received the final yield points for the 2016 season. The data has been analysed and yield maps have been created for the Herbert (for the blocks where the harvesters have yield monitors). Wilmar was providing monthly yield monitor points updates to HCPSL throughout the crush. This provided HCPSL an opportunity to detect several yield monitors which were not working properly to be identified and repaired quickly. Since the closure of the HRIC in 2015, HCPSL has lacked a simple way to provide the yield maps to growers, such as the web portal that was used by the HRIC. HCPSL is considering what alternatives there are to provide yield maps to growers and what technologies may provide this capacity.

ASSISTING SRA WITH RTK GEAR AND EM 38

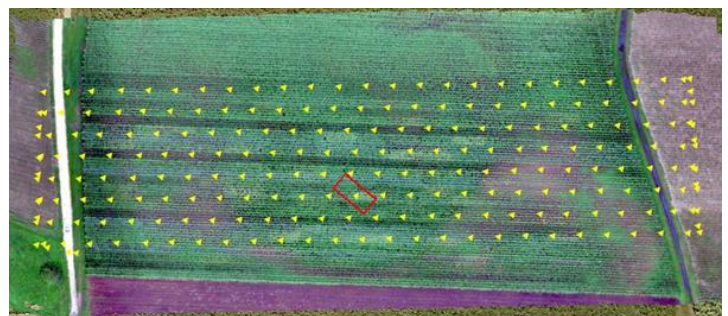
HCPSL and SRA share not only a building, but also knowledge, expertise and at times, resources. Recently HCPSL have assisted SRA with utilising their RTK GPS equipment and their EM38 (borrowed from SRA Burdekin). HCPSL staff went through the data logger setup and EM38 calibration process to collect some basic data and are then able to help SRA staff to make the most of their time with their equipment. In return HCPSL was able to use the EM38 to collect some electromagnetic conductivity (EC) data in the phytotoxicity trial. The EM38 is portable enough to be carried down the inter-row relatively easily. The data collected showed the same pattern as was evident in the UAV aerial photography.

HCPSL has been able to assist SRA with their RTK GPS equipment which was purchased some time ago for use in the plant breeding program. The RTK accuracy allows researchers to return to the same stool each year, even after harvest with very high degree of certainty. Through assisting SRA with the application of this equipment, HCPSL have been able to borrow the GPS gear to locate soil sample points in trials which will enable return-to-point periodically to assess any changes to soil chemical composition.

PHYTOTOXOCITY (HERBICIDE TOLERANCE) WORK

In considering the application of the use of drones in HCPSL, several flights were taken over the phytotoxicity trial to assess the usefulness of a drone in such circumstances. A flight on the 9th of January, 2016, at an elevation of 50 metres acquired 225 images over the trial. These images were processed using Agisoft Photoscan software to produce a single image covering the entire trial site. The trial consists of five cane varieties, fifteen treatments and four replicates, totalling 300 individual plots of twenty metres long by three drills of cane wide.

The processed image provided an alternative view of the trial from the air where the effects of several of the treatments can be seen in the cane and compared across the entire trial. While this provides a visual of the trial, if the same flight were undertaken with a drone using a multispectral camera, processing and analysis could include an NDVI (normalised difference vegetation index) of the trial, which would allow a numeric figure to be applied to each trial plot. After ground truthing by a visual assessment from the ground these flights and processing could be done with a greater frequency over the trial to collect data, even after rainfall events when physical entry into the trial plots is not possible or practical.



Drone flight area showing the replicates in a trial, and the locations where aerial photos were taken.

GROWER FORUMS

Three rounds of grower forums were conducted in 2016. The first was held in April and then again in September and October. Each round consisted of five individual forums located within each of the Abergowrie, Stone River, Ingham Line, Central Herbert and Macknade sub-districts. Approximately 200 growers attended all three rounds of forums. Topics presented and discussed included -

April (6th – 7th April)

- Grub monitoring (Nadar Salam, SRA)
- Varieties (Heidi Clements & Rod Fletcher, SRA)
- Pachymetra Survey & Approved Seed Plots (Graeme Holzberger, HCPSL)
- QCANESelect (Sam Sellick, HCPSL)
- Irrigation / Rotational Cropping (Alex Peachey, HCPSL)

September (6th – 7th September)

- Managing nitrogen losses (Adam Royle, HCPSL)
- Enhance efficiency fertiliser (Kirsten Verburg, CSIRO)
- Modern farming systems (Alan Garside, Agronomist)
- Managing for Standover (Lawrence Di Bella, HCPSL)

October (11th – 12th October)

- Project Catalyst (Michael Waring, Terrain)
- Grub control with suSCon maxi Intel® (Greg Wells & Richard Jackman, DOW)
- Harvesting updates (Jim Kirchner, Wilmar)
- Irrigation Scheduling (Steve Attard & Andres Jaramillo, SRA)

GROWER WALK & TALK DAY

The Herbert Walk and Talk Day was held on the 21st. April 2016, and is an initiative of HCPSL and SRA. This was the third year the event was held. The day consisted of both a field trip and presentations.

The morning field tour visited the following locations:

- The SRA Herbert YCS trial located at the HCPSL Stone River farm.
- The joint HCPSL and SRA YCS trial located in the Palm Creek area.
- The legume management trial (managed by HCPSL), in the Wharps area.
- A new herbicide trial showcasing Amitron® and Valour®, in the Wharps area.

Over lunch the 2015 industry awards were presented. The list of recipients is on Page 6 of this report.

The day concluded with indoor presentations by:

- SRA - "New horizons in plant health".
- SRA and HCPSL - "What drives productivity in the Herbert?"
- ADMA - "The use of Bobcat Imax, Pyrinex Super and Nimitz."

The event was well attended by over 150 growers and industry stakeholders.



Sam Sellick presenting on QCANESelect at the Macknade Forum



Graeme Holzberger presenting at the Grower Forum in April



Alan Garside presenting at the Grower Forum in September



Growers at the Walk & Talk Day



Become part of the movement:

Sign up to Smartcane BMP

Contact your local Smartcane BMP facilitator. Get recognised for what you are already doing.

www.smartcane.com.au

Statistics

As at March 22, 2017

Queensland

- Businesses Benchmarked 1,525
- Area Benchmarked 267,091 ha
- Businesses Accredited 184
- Area Accredited 49,206 ha

Herbert River

- Businesses Benchmarked 284
- Area Benchmarked 51,969 ha
- Businesses Accredited 43
- Area Accredited 10,134 ha

BMP will help you to:

- meet legislative obligations, *and*
- maintain access to international markets

There would be few growers in our region who are not feeling the pressure of governments and communities to show, in a more structured way, that we are responsible stewards of our land.

The pathway to evidence our sustainable farm practices is through Smartcane BMP, our own industry-owned and managed Best Management Practice program.

Growers are urged to work through Smartcane BMP because it is a locally-relevant program designed by industry to demonstrate responsible stewardship for our Great Barrier Reef, with an additional focus on practices to improve productivity.

Growers are encouraged to benchmark and seek accreditation in Smartcane BMP in the knowledge that it will soon incorporate an extra, international layer of significance and value.

Smartcane BMP is working collaboratively with Bonsucro to get the best from both programs for the benefit of all Australian cane growers, our environment and social awareness, as well as future markets.

Larger international customers, such as Coca Cola, Nestle and Pepsi, are increasingly demanding sustainable sugar and this is where Smartcane BMP accreditation puts you in the best position to take advantage and maintain these increasing markets.

Registering for Smartcane BMP is easy. Contact Smartcane BMP facilitator for the Herbert Region, Maria Battoraro.

Maria is located at the Herbert CANEGROWERS office and she can be contacted on 4776 5350.

Workshops are being held regularly and there is assistance and resources available to help you through the BMP process including for record keeping.