HCPSL
Herbert Cane Productivity Services Ltd.

RP210 – Tailored nutrient and farm management solutions for the Herbert catchment area (Herbert RP161)

Milestone Report #4

Milestones	Outputs and other deliverables that make up this milestone	Milestone Key Performance Indicators See Supporting Information Part G	Submission date for outputs and deliverables	OGBR review of milestone (date)
Milestone 4 Collect and collate grower data through the grower survey, undertake soil surveys and undertake farm inspection for Year 1 growers. Benchmark A and P2R recording Deliver crop and nutrient management plans to all growers	Benchmark A P2R data NMP	All farms benchmarked (Benchmark A collected) Farm inspections conducted P2R data submitted Nutrient management plans delivered	30 September 2019	31 October 2019

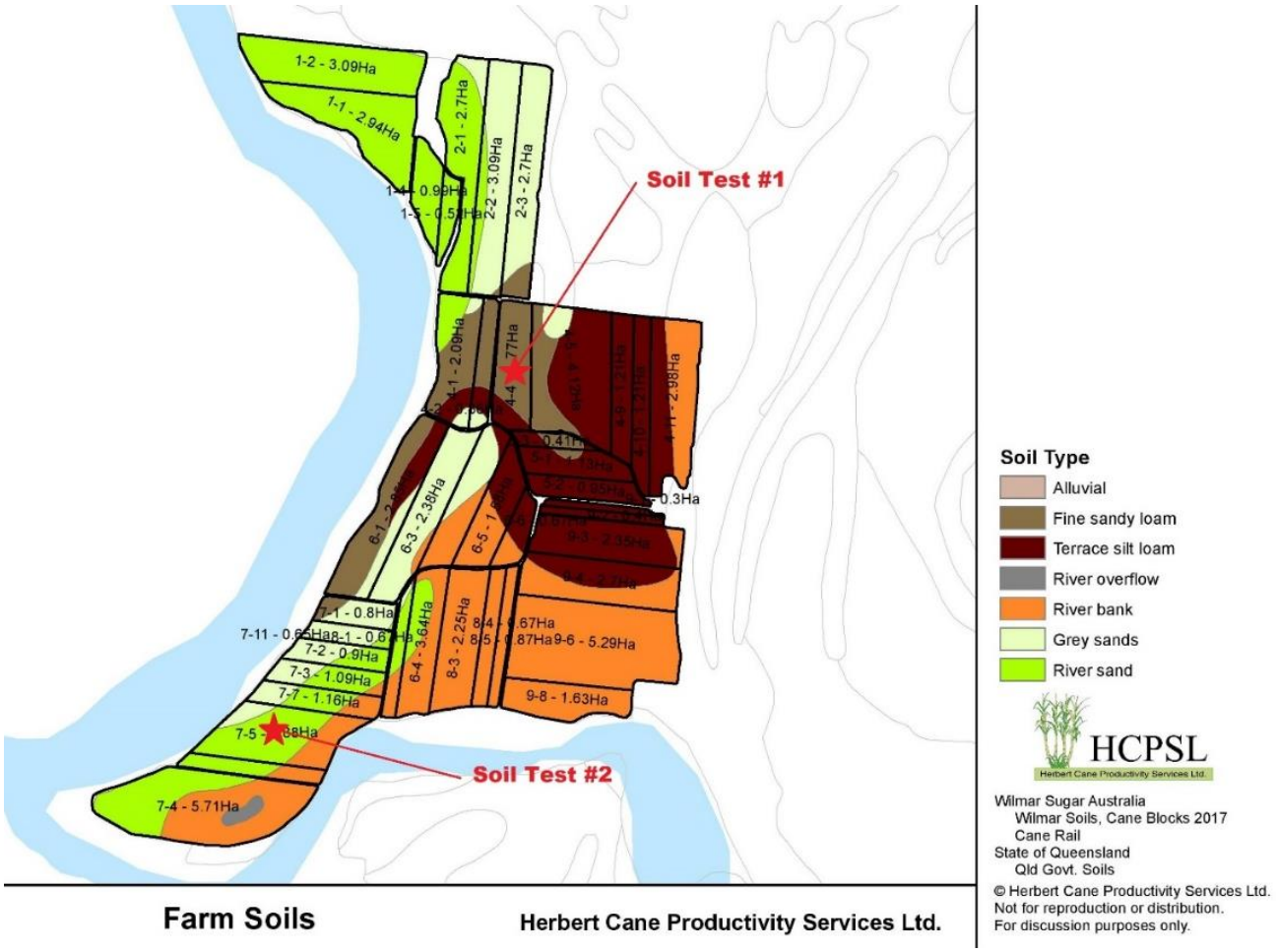
Collect and collate grower data through the grower survey, undertake soil surveys and undertake farm inspection for Year 1 growers.

Grower Surveys

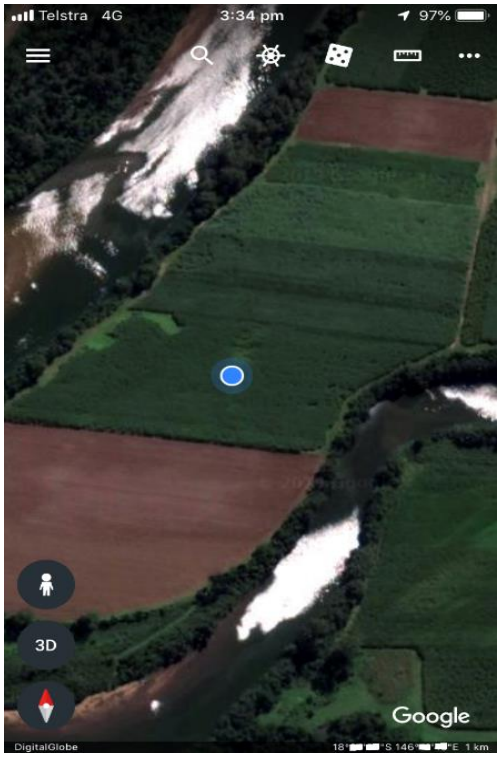
- All 53 farm surveys were completed and included;
  - Grower/farm details
  - P2R benchmarking questions
  - Social indicator questions
  - Current farm management practises (nutrient, fallow, variety and pest & disease)
- Benchmarking was conducted via on-farm visits, which included a tour of the farm and one-on-one discussions regarding current practises as well as infield and/or resource based constraints to the farming enterprise

Soil Surveys

- Soil surveys of fallow blocks (2019 plantings) were undertaken on all farms and, along with historical soil testing results, were used to develop nutrient plans
- The 5000:1 soils layer developed by Dr Andrew Wood has been crucial in developing soil survey strategies, except in the Ingham Line area where no surveys were conducted (The Qld government soils layer was referred to in these instances).
- Alongside six easy steps guidelines, farm soil maps, on-ground block variability assessments, EM mapping and historical crop yield data were used to assist in developing better soil survey sampling strategies.
- The use of Google Earth as a tool for geo-referencing tool for soil sampling was recognised as far too inaccurate and after discussions with HCPSL GIS staff infield geo-referencing for soil surveys now utilise the "Coordinates" app via smartphone.
- Several growers have taken advantage of the HCPSL DualEM soils mapping service and subsequent soil surveys based on these EM maps have been used to identify soil constraints (sodicity, salinity etc).
- Aside from fertiliser recommendations, project staff have worked to address soil constraints in order to improve productivity and better utilise other nutrients applied.
- Several growers also opted to soil sample selected ratoon blocks to assist with diagnosis of productivity and/or pest and disease issues.



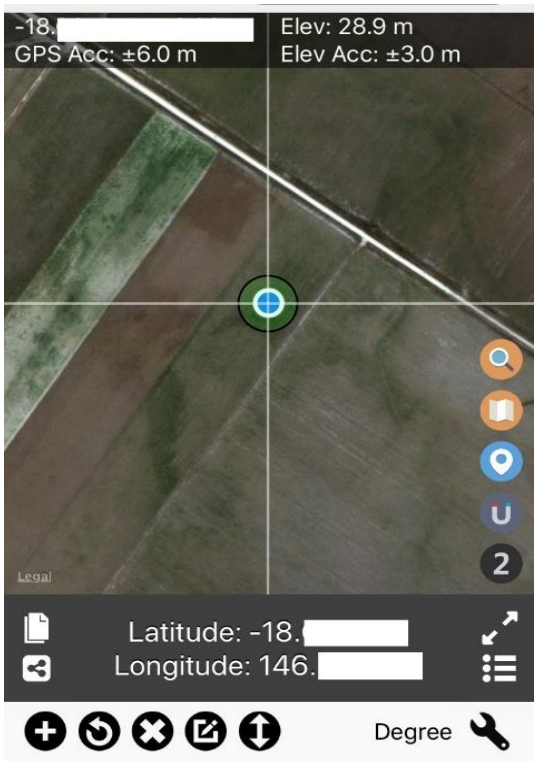
Above: A soils map, based on Dr Andrew Wood's soil surveys, developed by HCPSL that assisted with soil surveys.



Left: Screen shot of soil sampling point using the less accurate Google earth app.

Right: Screenshot of soil sampling point using the Coordinates App.

Below: An EM map created by HCPSL showing soil survey points based on prediction of differing soil constraints.



Farm Inspections

- All farms have been visited at least once this period with several receiving multiple visits
- Aside from benchmarking farm inspections included;
    - Crop surveys (variety & farming systems)
    - Nutrient application assessment (current fertiliser, ameliorant applications and methods of application)
    - Soil surveys
    - Pest & disease assessments
    - Drainage assessments
    - Equipment calibration

Nutrient (Depth -)	Result	Low	Marginal	Sufficient	High	Excess	Sufficiency Range
pH (1:5 H2O)	5.3						5.5 - 8.5
pH (1:5 CaCl2)	4.1						4.7 - 7.7
EC (1:5 H2O) dS/m	0.01						0.00 - 0.20
EC (se) (dS/m)	0.1						0.0 - 1.7
Organic carbon (Walkley Black) %	0.69						1.20 - 2.00
Phosphorus (BSES) mg/kg	19.1						40.0 - 50.0
Phosphorus Buffer Index (Colwell) (PBIc)	182						15 - 420
Potassium Exch (Group) cmol+/kg	0.06						0.40 - 2.00
Potassium (Nitric K) cmol+/kg	0.83						0.70 - 2.00
Potassium % of CEC	2.3						3.0 - 10.0
Sulfate-S (MCP) mg/kg	4.7						15.0 - 25.0
Calcium Exch (Group) cmol+/kg	2.14						2.00 - 20.00
Calcium % of CEC	40.5						55.0 - 90.0
Magnesium Exch (Group) cmol+/kg	0.74						0.25 - 10.00
Magnesium % of CEC Group	14.0						0.0 - 25.0
Sodium Exch (Group) cmol+/kg	0.03						0.00 - 1.00
Sodium % of CEC Group	1.2						0.0 - 6.0
Electrochemical Stability Index	0.009						0.050 - 10.000
Aluminium (KCl) cmol+/kg	2.22						0.00 - 0.50
Aluminium % Saturation (Group)	42.0						0.0 - 10.0
eCEC cmol+/kg	5.3						2.0 - 40.0
Copper (DTPA) mg/kg	0.80						0.20 - 1.00
Zinc (DTPA) mg/kg	0.63						0.30 - 1.00
Zinc (BSES-HCl) mg/kg	0.8						0.6 - 1.0
Manganese (DTPA) mg/kg	65.3						2.0 - 200.0
Iron (DTPA) mg/kg	75.8						4.0 - 400.0
Silicon (CaCl2) mg/kg	38.1						10.0 - 2,000.0
Silicon (BSES) mg/kg	225.2						70.0 - 2,000.0

Benchmark A and P2R recording

- A simple project farm database was established by extension staff to record and track the following;
    - Farm data (pre and post project benchmarking (including P2R and social indicator data), on-farm assessments, soil survey data etc)
    - Grower contact (number of and reason for interaction between grower and extension staff)
    - Grower progress (tracking of key milestones for each grower – benchmarking, soil surveys, equipment calibration, delivery of nutrient and crop plans etc)
- Herbert RP161 staff initially delayed the processing and importing of P2R data into Collector due to time constraints in developing and delivering the farm crop and nutrient plans
- Upon completion of crop and nutrient plans project staff developed a de-identified farm layer for each participating grower for importation into Collector
- Importation of relevant de-identified farm data has now been completed
- Project staff are now investigating options for importing social indicator data

Deliver crop and nutrient management plans to all growers

- The last of all 53 year 1 nutrient & crop plans were delivered to growers on Sept 20th, 2019
- A small number of plans required further tweaking after initial discussions with grower however the majority were accepted without change

Fallow Management Advice

How to get more from your fallow?

- Take soil test immediately after harvest
- Apply required ameliorants
- Correct any drainage issues and consider laser levelling if required
- Manage for volunteer cane and weeds (i.e. Verdict®)
- Consider using fallow crops (legumes and mixed species) to improve soil health
- Avoid leaving fallow ground bare if there is a risk of water inundation
- Use EM mapping to identify issues in problem blocks (i.e. – sodicity)

How to grow legumes in the Herbert

- Ensure soil pH is above 5.5
- Consider mounding or correcting drainage issues to prevent legumes from waterlogging
- Use the right inoculant for your legumes
- Ensure volunteer cane and weeds are managed
- Terminate fallow crops before soil moisture is depleted for the subsequent crop
- Delay incorporation of fallow crop stubble, if possible, before planting, to maintain the maximum amount of nitrogen for the subsequent crop

Top tips for improving fallow and plant crop establishment

1. Consider direct drilling a legume or mixed species fallow crop to improve soil health (control Symphyla at planting with Lorsban or Pyrinex)
2. Develop a Weed Management plan (Richard Hobbs, HCPSL)
3. Plant a dedicated seed block for 2020 planting, including SRA14 (Pachymetra resistant)
4. Apply ameliorants prior to or early in fallow to allow time to take effect prior to planting and for the benefit of fallow crops

For further agronomic advice contact the HCPSL office

Block	Harvest Management	Recommended Varieties	Comments	Actual Variety Planted
2-1 2-2 2-3	Early	Q231	Previous Variety: Q208 Grower Preference: Nil Alternate Options: Early - Q183, Q253 (2nd round onwards) Mid-Late -Q183, Q242, SRA14	
	Mid	Q253		
	Late	Q253		
5-5	Early	Q231	Previous Variety: KQ236 Grower Preference: Nil Alternate Options: Early - Q183, Q253 (2nd round onwards) Mid-Late -Q183, Q242, SRA14	
	Mid	Q253		
	Late	Q253		
7-2 7-3	Early	Q231	Previous Variety: Q232 (7-2), Q208 (7-3) Grower Preference: Nil Alternate Options: Early - Q183, Q253 (2nd round onwards) Mid-Late -Q183, Q242, SRA14	
	Mid	Q253		
	Late	Q253		
11-1	Early	Q208	Previous Variety: Q200 Grower Preference: Q240 Alternate Options: Early - Q250 Mid-Late - Q240, Q253, SRA14	
	Mid	Q208		
	Late	Q208		

Ratoon Cane Fertiliser Plan **2019**

Farm Number: 0001A

Block Number	Area	Crop Class	Variety	Soil Type	Fertiliser Required (t)	Product Recommended	% N	% P	% K	% S	Product Application Rate (kg/ha)	Product Application Rate (bags/ac)	N Supplied (kg/ha)	P Supplied (kg/ha)	K Supplied (kg/ha)	S Supplied (kg/ha)	Date Applied	Record Made By	Comments / Changes
Required nutrient from soil test interpretation													140	0	100	5			
HBT-0001A-01-01	2.18	6R	Q208	Sandy/Silty Clay	1.1	GF 554	27.4		16.8	3	510	4.1	140		86	15			
HBT 0001A 01 02	1.59	PL	Q250	Sandy/Silty Clay	0.8	GF 554	27.4		16.8	3	510	4.1	140		86	15			
HBT-0001A-01-03	2.17	7R	Q208	Sandy/Silty Clay	1.1	GF 554	27.4		16.8	3	510	4.1	140		86	15			
HBT-0001A-01-04	2.17	3R	Q232	Sandy/Silty Clay	1.1	GF 554	27.4		16.8	3	510	4.1	140		86	15			
HBT 0001A 01 05	5.38	PL	Q250	Sandy/Silty Clay	2.7	GF 554	27.4		16.8	3	510	4.1	140		86	15			
HBT-0001A-01-06	4.22	4R	Q208	Sandy/Silty Clay	2.2	GF 554	27.4		16.8	3	510	4.1	140		86	15			
HBT-0001A-01-07	3.35	1R	SRA5	Sandy/Silty Clay	1.7	GF 554	27.4		16.8	3	510	4.1	140		86	15			
HBT-0001A-01-08	5.39	2R	MXD	Sandy/Silty Clay	2.7	GF 554	27.4		16.8	3	510	4.1	140		86	15			
HBT 0001A 01 09	1.01	1R	Q253	Sandy/Silty Clay	0.5	GF 554	27.4		16.8	3	510	4.1	140		86	15			
HBT-0001A-01-10	2.06	1R	Q250	Sandy/Silty Clay	1.1	GF 554	27.4		16.8	3	510	4.1	140		86	15			
				Total (t)	15.1														
Required nutrient from soil test interpretation													150	10	100	25			
HBT 0001A 07 04	6.64	2R	Q240	Sandy/Silty Clay	3.8	GF 508	24.6	2.4	17.8	1.8	570	4.6	140	14	101	10			
HBT-0001A-07-05	4.7	6R	Q208	Sandy/Silty Clay	2.7	GF 508	24.6	2.4	17.8	1.8	570	4.6	140	14	101	10			
				Total (t)	6.5														
Required nutrient from soil test interpretation													140	20	100	5			
HBT 0001A 08 01	4.34	PL	Q240	Sandy/Silty Clay	2.5	GF 508	24.6	2.4	17.8	1.8	570	4.6	140	14	101	10			
HBT-0001A-08-02	6.51	7R	Q208	Sandy/Silty Clay	3.7	GF 508	24.6	2.4	17.8	1.8	570	4.6	140	14	101	10			
HBT-0001A-08-03	3.13	1R	MXD	Sandy/Silty Clay	1.8	GF 508	24.6	2.4	17.8	1.8	570	4.6	140	14	101	10			
HBT 0001A 08 04	1.9	PL	Q253	Sandy/Silty Clay	1.1	GF 508	24.6	2.4	17.8	1.8	570	4.6	140	14	101	10			
HBT-0001A-08-05	3.96	1R	Q200	Sandy/Silty Clay	2.3	GF 508	24.6	2.4	17.8	1.8	570	4.6	140	14	101	10			
HBT-0001A-08-06	3.43	3R	Q208	Sandy/Silty Clay	2.0	GF 508	24.6	2.4	17.8	1.8	570	4.6	140	14	101	10			
HBT-0001A-08-07	3.71	3R	Q232	Sandy/Silty Clay	1.8	GF 508	24.6	2.4	17.8	1.8	570	4.6	140	14	101	10			
HBT-0001A-08-08	2.79	3R	Q240	Black organic clay	1.6	GF 508	24.6	2.4	17.8	1.8	570	4.6	140	14	101	10			
HBT-0001A-08-09	7	5R	Q232	Black organic clay	4.0	GF 508	24.6	2.4	17.8	1.8	570	4.6	140	14	101	10			
HBT-0001A-08-10	8.18	2R	Q240	Black organic clay	4.7	GF 508	24.6	2.4	17.8	1.8	570	4.6	140	14	101	10			
HBT 0001A 08 11	8.28	2R	Q200	Black organic clay	4.7	GF 508	24.6	2.4	17.8	1.8	570	4.6	140	14	101	10			
HBT-0001A-08-12	1.77	1R	Q200	Black organic clay	1.0	GF 508	24.6	2.4	17.8	1.8	570	4.6	140	14	101	10			
HBT-0001A-08-13	0.26	8R	Q208	Black organic clay	0.1	GF 508	24.6	2.4	17.8	1.8	570	4.6	140	14	101	10			
				Total (t)	31.2	choose fertiliser													
						choose fertiliser													

General Activity Updates

Cane Connection Articles

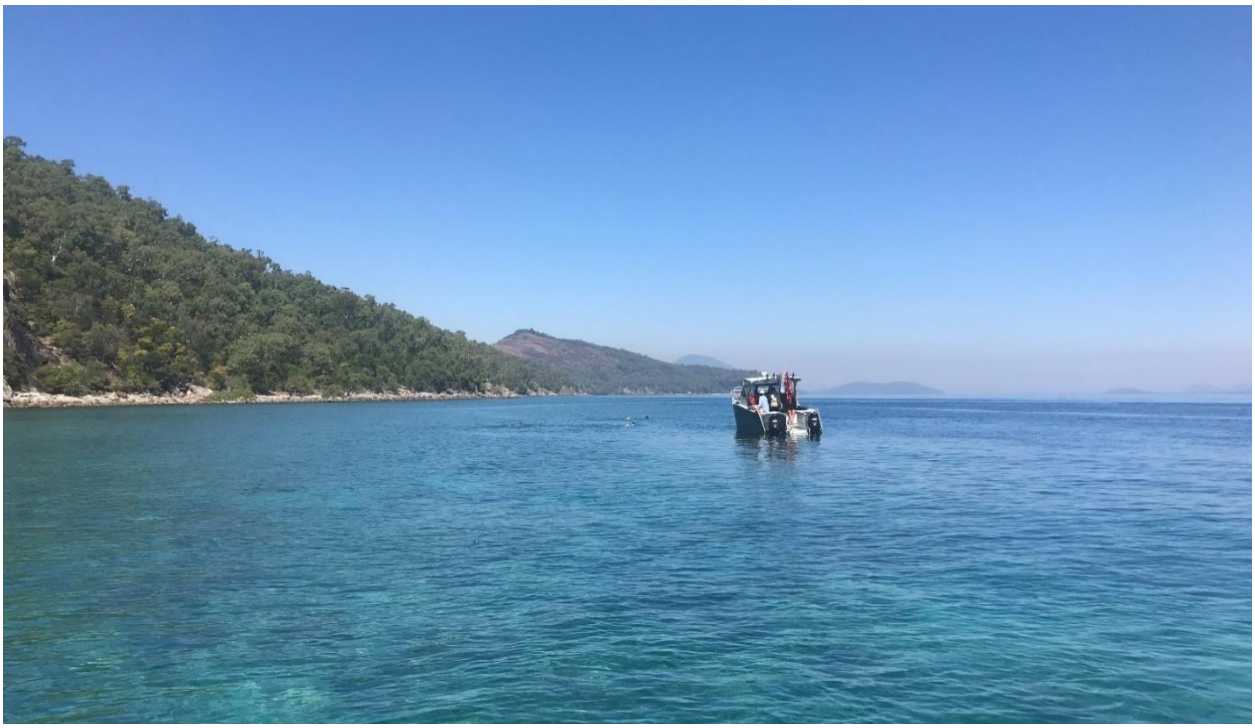
- The Herbert RP161 team was able to showcase two of its project grower participants during a visit by Brad Pfeiffer (SRA communications officer) and David Defranciscis (DES)
- Herbert grower Casey Jones feature in the recent Cane Connection publication, with sisters Briannan and Rebekah Pace expected to feature in the next edition

Above: SRA communications officer Brad Pfeiffer captures an image of Herbert RP161 Extension agronomist Shannon O'Brien (right) and Rebekah and Briannan Pace (left to right)

Below: An image of project Extension officer Adam Royle and grower Casey Jones captured by Brad Pfeiffer during a recent visit to promote the RP161 project

Reef Awareness and Appreciation Field trip

- In early September Herbert RP161 staff joined Herbert WTSIP staff on a field trip to the Palm islands with the objective of providing real-life context to the benefits of good nutrient management and positive water quality outcomes
- Staff experienced first-hand, from above and below the waterline, healthy and degraded coral reef
- Staff were also provided with a platform to discuss how coral reef systems functioned and the important role healthy reef plays in the marine environment



Above & Below: Images captured by RP161 and WTSIP staff during the reef appreciation and awareness field trip to the Palm islands

Above: Ellie McVeigh (left) and Shannon O'Brien calibrate a fertiliser box

Staff

- Apart from daily interactions project staff meet regularly during Monday morning project updates.
- Monday morning updates are extended to other HCPSL staff working in the nutrient management space and provide a forum to share knowledge and information and discuss relevant issues.
- Meetings with HCPSL manager, grower advocate and board representatives have also occurred during this reporting period, primarily to provide updates and discuss potential resourcing and other requirements/issue.
- Senior staff have provided mentoring and on-farm upskilling of newer staff, including equipment calibrations and methods to address soil constraints (sodicity, salinity etc).

Farming 4 CASH™ Workshops

- Extension staff met on several occasions to progress planning for Farming 4 CASH™ workshops
- Staff also met with Dr Andrew Wood (Tanglewood Agricultural Services) on two separate occasions to map out workshop activities that will assist in engaging with and upskilling growers in soil and crop health and nutrient management principles and practises
- The 3rd and 4th December 2019 has been set for the first round of Farming 4 CASH™ workshops

Above: Dr Andrew Wood (3rd from the left) delivers an "Understanding Soils in the Herbert region" workshop to SRA and HCPSL staff in 2018

General Learnings & Observations

- All participating growers (year 1) have returned project-grower contracts and participation fees early in this reporting period
- Apart from specific RP161 discussions, staff and HCPSL manager also discussed how future nutrient planning may be delivered industry wide pending outcomes of the new regulations and requirements of all growers to develop nutrient plans.
- Staff have also discussed thoughts, ideas and concerns with the HCPSL board and plan to continue to progress possible options and ideas over the coming months; although it should be noted that currently staff believe that the magnitude of this task would prohibit the delivery of nutrient planning industry wide using the current RP161 model.
- Grower attitudes have predominantly been positive towards their completed nutrient management plans, backed up by the high number of year 1 growers wishing to participate in year 2.
- Several growers have raised concerns regarding their nutrient plans and the high level of variability between their N and P requirements. Most concerns revolved around the inflexibility of P (phosphorus) application rates in ratoon crops, and inverse relationship between P and N (nitrogen) application rates. Due to these inflexibilities several growers have had to choose between supplying adequate N or adequate P and have voiced concerns regarding effects on productivity and/or profitability.
- Some soil surveys using EM mapping and strategic soil testing have raised concerns over the level of variability of P within a block. Examples of multiple soil tests collected from the same block returning both a zero P requirement and a P application requirement have been experienced by staff. Potential impacts on productivity/profitability of these farms, based on this infield variability of P and the lack of flexibility under the current regulations to account for these variations, have raised concerns.
- The accuracy and timeliness of farm maps have again been raised as a constraint to delivering nutrient management plans in an efficient and timely manner. HCPSL is currently investigating ways to improve this situation.
- Variable rate nutrient and ameliorant application remains a challenge with more questions than answers being raised as our understanding and the technology evolves.