Catalyst Project Report

Grower Information	
Grower Name:	Brendan Swindley
Entity Name:	Canejewel Pty Ltd
Trial Farm No/Name:	BKN-02807A
Mill Area:	Inkerman
Total Farm Area ha:	34
No. Years Farming:	
Trial Subdistrict:	Fredericksfield
Area under Cane ha:	

Background Information

Aim: To develop a site-specific nitrogen reduction rate that the grower can implement on their blocks that are irrigated with underground water high in nitrates.

Background: (Rationale for why this might work)

There are a number of growers in the Burdekin that are irrigating their sugarcane with water that is high in nitrates. This nitrogen is plant available and can be used as part of the farm's fertiliser program. There a number of issues with reducing fertiliser rates according to the amount applied via irrigation water. Firstly, the level of nitrates may vary throughout the season so there is no set amount of nitrogen that is applied to paddock per irrigation. Secondly, the number of irrigation events may be increased or decreased, depending on the annual rainfall volume and pattern. Due to this variability, developing an area wide "nitrogen-reduction-rate" for farms in areas with ground water nitrates is a difficult and inexact process. To compensate for this, monitoring the level of nitrates in irrigation water on a specific block will be conducted for 6-12 months. This data will be used to calculate the total amount of nitrogen applied to the paddock through irrigation over a season. After this, a "safe" reduction rate (or rates) will be developed and implemented in a trial, comparing it to the recommended 6 Easy Steps rate of fertiliser. There will also be a 20m strip of "Zero-N" where no fertiliser will be applied. This will be used to assess how available the irrigation-nitrates are to the crop. The trial will be reimplemented and harvested for a second year.

Potential Water Quality Benefit:

Reducing nitrogen fertiliser rates to compensate for nitrogen applied with the irrigation water, could see (in high nitrate areas) large reductions of fertiliser applied. With less fertiliser applied, there is less risk of the applied nitrogen being lost to run off/deep drainage.

Expected Outcome of Trial:

That a "safe" nitrogen deduction value will be produced for the grower, that he will be able to implement on his farm, minimising risks to water quality and his productivity.

Service provider contact: Billie White (0409 477 359, billiew@farmacist.com.au)

Where did this idea come from: There have been a number of ground water nitrate projects conducted in the Burdekin, though the focus has been placed on an area-wide solution. This idea was developed to provide a number of growers will safe nitrogen reduction values that are specific to their farms.

Plan - Project Activities	Date : (mth/year to be undertaken)	Activities :(breakdown of each activity for each stage)
Stage 1	**September 2016-August 2017**	- A specific block has been selected for monitoring - Regular monitoring of irrigation water samples for nitrates - The grower is keeping a record of irrigation timings and lengths in this period, for that block - A bucket a stopwatch assessment will be conducted to assess flow rate - This data will be used to assess the total amount of nitrogen being applied to the crop over the season - This data will be then used to develop a "safe nitrogen reduction"
Stage 2	**November 2016-October 2017**	- A trial will be implemented on the monitored block - This trial will compare the 6 Easy Steps rate to the reduced rate of fertiliser *that the grower is currently using*. There will also be a zero N treatment. - Biomass samples will be taken to assess nitrogen uptake - This trial will be harvested and the data will be analysed for differences in yield between the treatments
Stage 3	**October 2017-October 2018**	- A trial will be re-implemented on the monitored block. The deduction value may change, depending on the results of the monitoring. - This trial will compare the 6 Easy Steps rate to a reduced rate of fertiliser. There will also be a zero N treatment. - Biomass samples will be taken to assess nitrogen uptake - This trial will be harvested and the data will be analysed for differences in yield between the treatments
Stage 4	**October 2018 – October 2019**	- A trial will be re-implemented on the monitored block. The deduction value may change, depending on the results of the monitoring. - This trial will compare the 6 Easy Steps rate to a reduced rate of fertiliser. There will also be a zero N treatment. - Biomass samples will be taken to assess nitrogen uptake - This trial will be harvested and the data will be analysed for differences in yield between the treatments
Stage 5		
Stage 6		

Project Trial site details

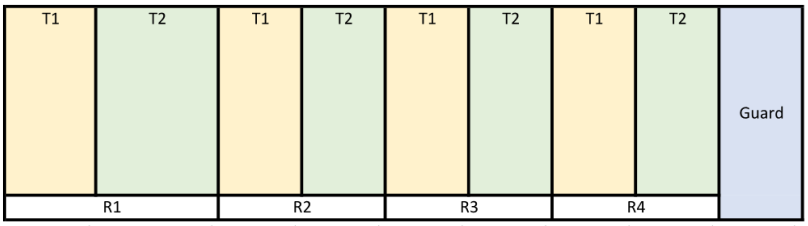
Trial Crop:	Sugarcane
Variety: **Rat/Plt:**	Q183 (2R)
Trial Block No/Name:	1-1
Trial Block Size Ha:	6.72ha
Trial Block Position (GPS):	19˚ 43’ 30.55’’ S 147˚ 24’ 45.02’’ E
Soil Type:	Clay

Block History, Trial Design:

The block is used for cropping sugarcane. Due to previous gorund water nitrate monitoring projects, the grower has already implemented a reduction of 30kgN/ha to his fertiliser rates. For the first trial, we will trial his deduction against the 6 Easy Steps recommended rate. In the future two trials we will use a deduction based on the monitoring conducted between October 2016 and August 2017.

2016 trial design

Brendan Swindley
Block 1-1
Variety Q183
Ratoon 2R
Date Applied 1/11/2016



Block 2-1
Yellow Outlet

6 6 6 6 6 6 6 6 3

House

Road

This trial was harvested in 2017 and a second trial (randomised and replicated) as implemented on a new block. This new trial is comparing the grower's current rate (170N to a significantly reduced rate of 100N). There is two treatments and 5 replications. The bores will still be monitored through

Brendan Swindley
Groundwater Nitrates
Block 2-1
Variety Q183
Ratoon 3R

Siding End

	Guard	T1	T2	T2	T1	T2	T1	T1	T2	T1	T2		Guard
		R1		R2		R3		R4		R5			Zero N 30m
No. Rows	4	4	4	4	4	4	4	4	4	4	4	1	4	3
Plot Area	0.530352	0.530352	0.530352	0.530352	0.530352	0.530352	0.530352	0.530352	0.530352	0.530352	0.530352		0.7955	

Top of Block

Treatments	Product	Rate (kg/ha)	N (kg/ha)	P (kg/ha)	K (kg/ha)	S (kg/ha)
T1	Nitra-King (S)	635	173	0	104	21
T2	CK 50/50 (S)	500	107	0	107	21

Treatments:

2016
T1 – Imapct 161 (S) @ 770kg/ha (200N)
T2 – Impact 161 (S) @ 655kg/ha (170N)
(Replicated 4 times)

2017
T1 – Nitra-King (S) @ 635kg/ha (170N)
T2 – CK 50/50 @ 500kg/ha (107N)
Zero N (30m)
(replicated 5 times)

Results:

2016-2017 Results:

FARMACIST

Soil Sample Analysis Summary Report

Lab Sample Id		21778308
Test Code		FA3
Sample Name		BKN-02807A
GPS Name		Swindley
Paddock Name		1-1
Sample Depth (cm)		0 - 20
Sampling Date		29/9/2016

Analyte / Assay	Units	
Soil Colour		
Soil Texture		
pH (1:5 Water)		8.5
pH CaCl		7.72
ECSE	dS/m	2.064
EC (1:5)		0.24
Chloride	mg/kg	206
Organic Carbon (OC)	%	1.22
Nitrate Nitrogen (NO3)	mg/kg	
Phosphorus (Colwell)	mg/kg	14
Phosphorus (BSES)	mg/kg	111
PBI-Col		38.5
Potassium (Amm-acet.)	Meq/100g	0.15
Potassium	%	0.67
Potassium (Nitric K)	Meq/100g	
Available Potassium	mg/kg	57.8
Sulphate Sulphur (MCP)	mg/kg	8.5
Cation Exchange Capacity	Meq/100g	21.9
Calcium (Amm-acet.)	Meq/100g	14.26
Calcium %CEC	%	65.05
Magnesium (Amm-acet.)	Meq/100g	6.06
Magnesium %CEC	%	27.63
Sodium (Amm-acet.)	Meq/100g	1.46
Sodium % of Cations (ESP)	%	6.65
Aluminium Saturation	%	0
Aluminium (KCl)	mg/kg	
Zinc (HCl)	mg/kg	9.79
Zinc (DTPA)	mg/kg	2.86
Copper (DTPA)	mg/kg	0.87
Iron (DTPA)	mg/kg	5.6
Manganese (DTPA)	mg/kg	4.39
Silicon (BSES)	mg/kg	792
Silicon (CaCl2)	mh/kg	

Min Max

Analyses conducted by Nutrient Advantage Laboratory Services, NATA Accreditation No: 11958

02/11/2016 02:45 PM

HORTUS TECHNICAL SERVICES

W2 - COMPLETE WATER TEST

FARMACIST

Client Information

Organisation	FARMACIST PTY LTD	**Analysis Request No.**	W14599-W2-B-Analytical
Name	Evan Shannon/Peter McDonnell/ Billie white	**Date Results Confirmed**	02/11/2016 3:51PM
Agent Phone	0429837497	**Purchase Order Number**	
Email	evans@farmacist.com.au; billiew@farmacist.(	**The Bill for this account will be sent to:**	146 Young St (Evan - 41 Cole Street, AYR) Ayr QLD 4807
Grower	Farmacist Pty Ltd	**Region**	World
Block Reference	Swindley Turbine	**Payment Status**	To be billed
Report No.	HTS1878898-02112016	**Date of Report**	2/11/2016

Field Information

Crop		**Soil Texture**		**Irrigation Type**	
Variety		**Soil Structure**		**Treatment Area**	0
Crop Stage		**Soil Colour**		**Yield Goal**	0.00

Method	Element	LOD	Result	Units	Optimal Range	Comment
	pH		7.4		5 - 8.5	Optimal
	EC		1.94	mS/cm	0.28 - 0.9	High salinity
G3a	Nitrate-N (water)		12.00	mg/L	0.5 - 10	High
	Phosphate-P		0.05	mg/L	0.5 - 2	Low
L3b	Potassium (water)		2.0	mg/L	0.5 - 15	Optimal
L1b	Calcium (water)		133.0	mg/L	10 - 60	High
L2b	Magnesium (water)		52.0	mg/L	10 - 100	Optimal
L4b	Sodium (water)		187.0	mg/L	20 - 150	High
J1a	Sulfate-S (water)		3.7	mg/L	5 - 50	Low
K1a	Zinc (water)		0.01	mg/L	0.5 - 2	Low
K1a	Copper (water)		0.00	mg/L	0.02 - 0.2	Low
K1a	Manganese (water)		0.01	mg/L	0.2 - 0.5	Low
K3b	Iron (water)		0.02	mg/L	0.01 - 0.3	Optimal
K5	Boron (water)		0.07	mg/L	0.3 - 0.5	Low
E1a	Chloride (water)		470.0	mg/L	20 - 350	High
HTSCALC	Total Dissolved Solids		1,241.6	mg/L	175 - 500	Irrigation Class 3

The methods of chemical test(s) included in this document are derived from:
GE Rayment and FR Higginson: Australian Laboratory Handbook of soil and water chemical methods, Inkarta Press Melbourne, 1992
GE Rayment and DJ Lyons: Soil Chemical Methods - Australasia, CSIRO Publishing Collingwood, 2011
B Cartwright, KG Tillier, BA Zarcinas and LR Spouncer: The chemical assessment of the boron status in soils. Aust. J. Soil Res. 21,321-32, 1983
MB C Haysom and GK Kingston: Soil analysis for predicting sugar cane response to silicon. Proc of the Australian Society of Sugar Cane Technologists, Poster Papers 21, 498, 1999
DW Nelson and LE Sommers: Total Carbon, Organic Carbon and Organic Matter in Methods of Soil Analysis, Part 2, Chemical and Microbiological Properties, 2nd ed. 539-577, 1982.
Note: OC result may be affected by soils with high chloride content.
Soil Analysis: an interpretation manual edited by K.I. Peverill, L.A. Sparrow and D.J. Reuter Published by CSIRO Publishing, 1999
AOCS Ca 5a-40. Free Fatty Acids. Revised 2012
AOCS Cd 8b-90. Peroxide Value Acetic Acid-Isooctant Method. Revised 2011
Optimal Range: Chemical Thresholds pertaining to Region, Soil type, Crop, Crop Stage, Sample Type and Analyte
Optimal Range and Comment are not included in the NATA Scope and not provided by the Analyst
Measurement Uncertainties for accredited analytes are available on request.

ASPAC

"This laboratory has been awarded a Certificate of Proficiency for specific soil and plant tissue analyses by the Australasian Soil and Plant Analysis Council (ASPAC). Tests for which proficiency has been demonstrated are highlighted in each report." * indicates elemental analysis certified by ASPAC

Signatory

Angela Hanke - Analyst

HORTUS TECHNICAL SERVICES

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Email	evans@farmacist.com.au; billiew@farmacist.(	**The Bill for this account will be sent to:**	146 Young St (Evan - 41 Cole Street, AYR) Ayr QLD 4807
Grower	Farmacist Pty Ltd	**Region**	World
Block Reference	Swidley Well	**Payment Status**	To be billed
Report No.	HTS1878897-02112016	**Date of Report**	2/11/2016

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Variety		**Soil Structure**		**Treatment Area**	0
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L3b	Potassium (water)		2.0	mg/L	0.5 - 15	Optimal
L1b	Calcium (water)		142.0	mg/L	10 - 60	High
L2b	Magnesium (water)		57.0	mg/L	10 - 100	Optimal
L4b	Sodium (water)		161.0	mg/L	20 - 150	High
J1a	Sulfate-S (water)		3.9	mg/L	5 - 50	Low
K1a	Zinc (water)		0.01	mg/L	0.5 - 2	Low
K1a	Copper (water)		0.00	mg/L	0.02 - 0.2	Low
K1a	Manganese (water)		0.01	mg/L	0.2 - 0.5	Low
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E1a	Chloride (water)		470.0	mg/L	20 - 350	High
HTSCALC	Total Dissolved Solids		1,235.2	mg/L	175 - 500	Irrigation Class 3

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Signatory

Angela Hanke - Analyst

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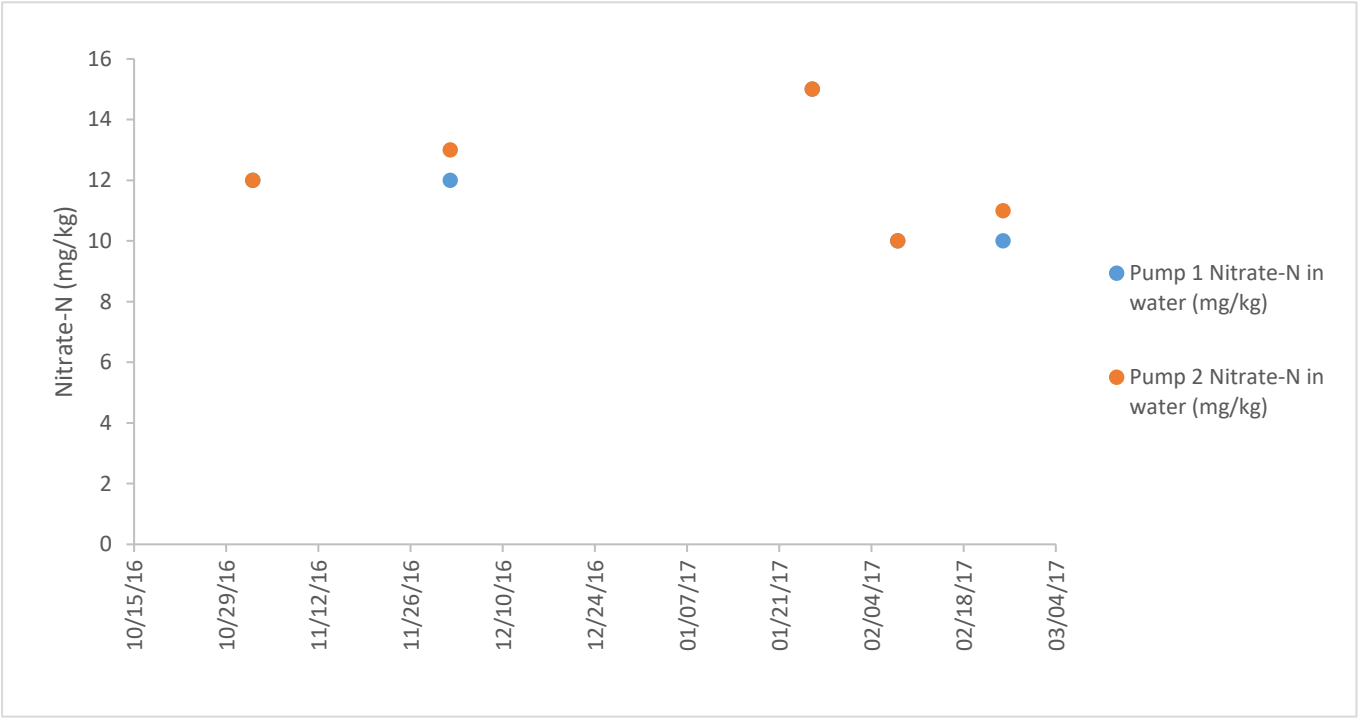
Ph: 07 4132 5000 Fax: 07 4151 7498 www.hortus.net.au techservices@hortus.net.au

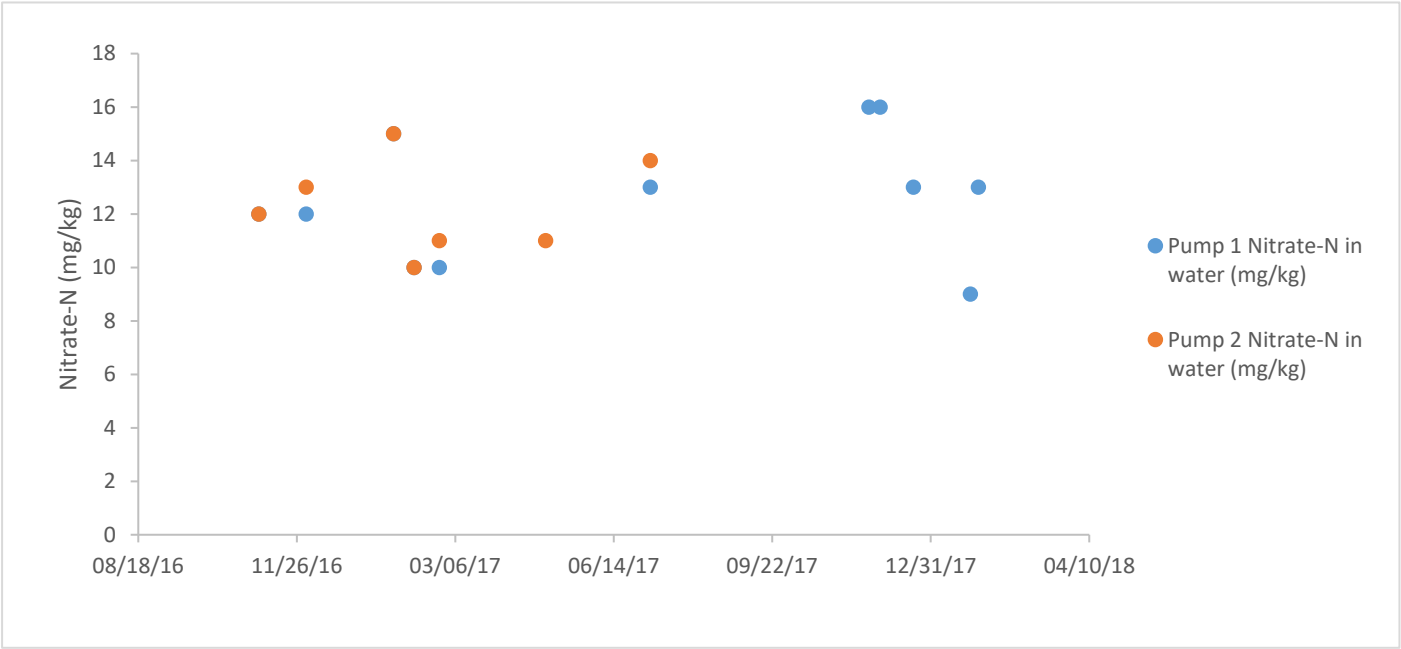
Current Monitoring Data:

Date	Pump 1 Nitrate-N in water (mg/kg)		Date	Pump 2 Nitrate-N in water (mg/kg)	
2/11/2016	12	Hortus Lab	2/11/2016	12	Hortus Lab
2/12/2016	12	Hortus Lab	2/12/2016	13	Hortus Lab
26/01/2017	15	Hortus Lab	26/01/2017	15	Hortus Lab
8/02/2017	10	Hortus Lab	8/02/2017	10	Hortus Lab
24/02/2017	10	Hortus Lab	24/02/2017	11	Hortus Lab



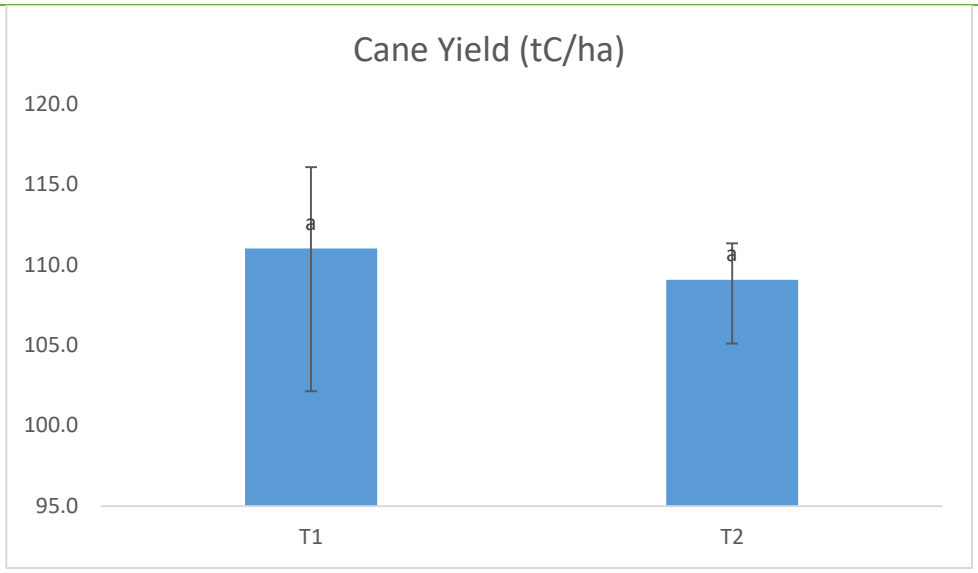
2017-2018 Results:

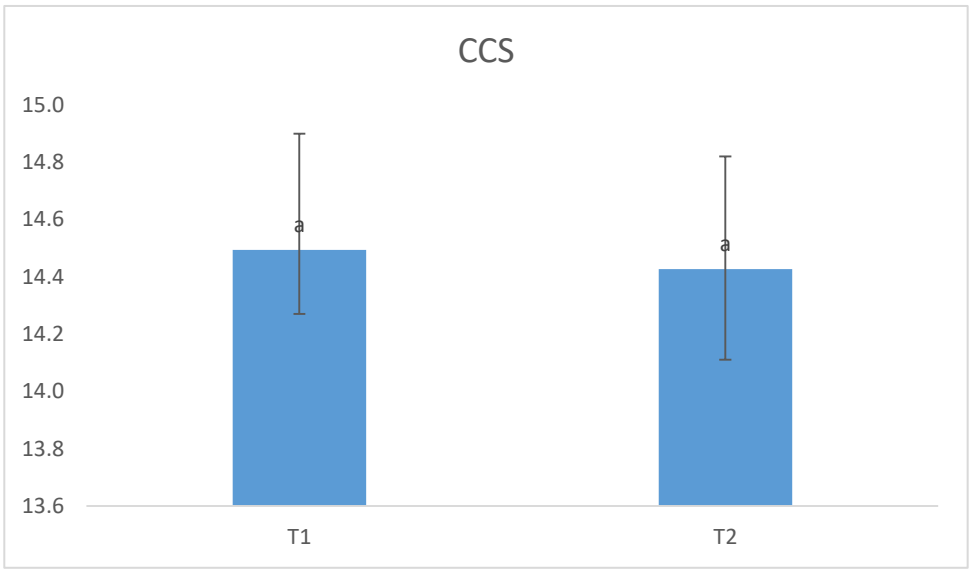
Date	Pump 1 Nitrate-N in water (mg/kg)		Date	Pump 2 Nitrate-N in water (mg/kg)
2/11/2016	12	Hortus Lab	2/11/2016	12
2/12/2016	12	Hortus Lab	2/12/2016	13
26/01/2017	15	Hortus Lab	26/01/2017	15
8/02/2017	10	Hortus Lab	8/02/2017	10
24/02/2017	10	Hortus Lab	24/02/2017	11
			2/05/2017	11
7/07/2017	13		7/07/2017	14
22/11/2017	16			
29/11/2017	16			
20/12/2017	13			
25/01/2018	9			
30/01/2018	13			

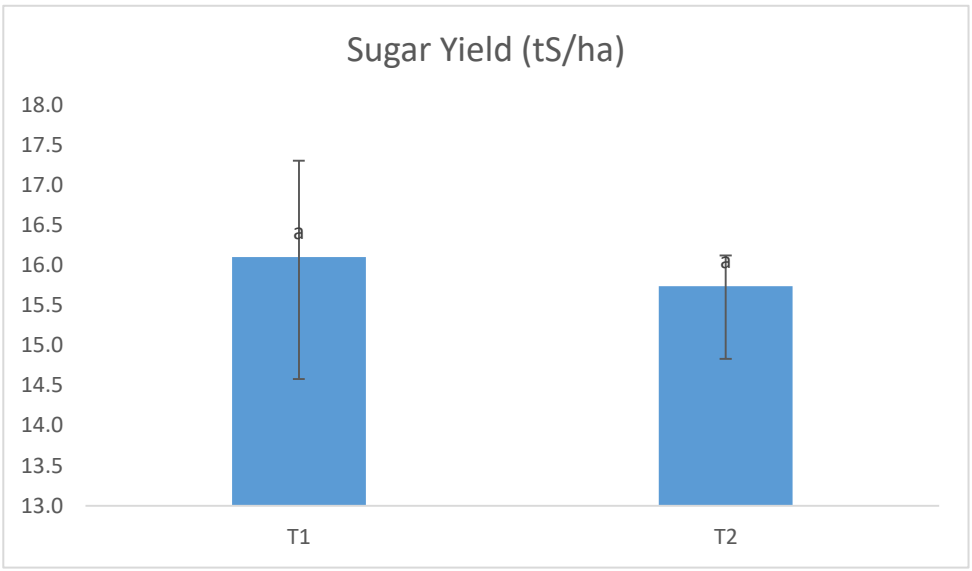


2016-2017 Harvest Results:

Treatment Averages	N Rate	Cane Yield (tC/ha)	CCS	Sugar Yield (tS/ha)
T1	210	111.0	14.5	16.1
T2	170	109.1	14.4	15.7







No significant difference between the cane, CCS or sugar yields.

Conclusions and comments
Advantages of this Practice Change:
Disadvantages of this Practice Change:
Will you be using this practice in the future:
% of farm you would be confident to use this practice :