

# Project Catalyst Trial Report

## Sub Surface Applied Mill By-Products

### Grower Information

<b>Grower Name:</b>	Wilmar Sugar
<b>Entity Name:</b>	Wilmar Sugar
<b>Trial Farm No/Name:</b>	Sub-surface applied mill by-products trial F# 0848A
<b>Mill Area:</b>	Victoria
<b>Total Farm Area ha:</b>	6,600 in total across Herbert, Burdekin, Proserpine and Plain Creek
<b>No. Years Farming:</b>	11 years since becoming Wilmar Sugar in 2010.
<b>Trial Subdistrict:</b>	Orient
<b>Area under Cane ha:</b>	1012.15 @ Farm# 0848

## **Background Information**

### **Aim:**

This project aims to investigate the use of varying rates of mill mud and ash banded sub-surface into the planting line, and whether transporting the mill by-products is economically viable, when the paddock is outside the traditional mill truck transportation area.

### **Background: (Rationale for why this might work)**

Mill by-products have traditionally been used as an ameliorant to improve soil conditions and as a source of nutritional value. By banding the mill by-products sub-surface into the planting line, the benefits are localised to the growing region of the soil and not lost to run off due to heavy rainfall events. Furthermore, banding the mill by-products means that less is required to be transported. This may reduce costs associated with transporting to areas outside the usual region of transportation by the mill trucks.

### **Potential Water Quality Benefit:**

Banding mill by-products sub-surface reduces the risk of loss to run off to the Great Barrier Reef. This is particularly important regarding phosphorous.

### **Expected Outcome of Trial:**

That the varying rates of mill by-products will have a positive impact on productivity. Though the rates in this trial are much lower than the commercially applied rates, banding will localise the benefits to the stool and reduce total volume of product required, predicted to reduce overall costs.

**Service provider contact:** Megan Zahmel 0447 317 102

**Where did this idea come from:** Wilmar/ Peter Larsen

<b>Plan - Project Activities</b>	<b>Date:</b> (mth/year to be undertaken)	<b>Activities</b> :(breakdown of each activity for each stage)
<b>Stage 1</b>	<b>Establish trial</b>	Baseline soil nutrient samples – 1 <sup>st</sup> of Dec 2015 Application of Mud and Ash – Dec 2015 Flumes set up to monitor water runoff quality. - 5 <sup>th</sup> Jan 2016 Nutrient soil samples after mud application – 4 <sup>th</sup> May 2016 Planted May 2016
<b>Stage 2</b>	<b>Sampling 2017</b>	Stalk counts and biomass - 10 <sup>th</sup> Nov 2016 - 16 <sup>th</sup> Feb 2017 Water runoff data collected – 26/01/2016 – 23/03/2017 Final Harvest results for 2017 – completed see attached results
<b>Stage 3</b>	<b>Sampling 2018</b>	Final Harvest results – Oct 2018 Soil samples - Nov 2018
<b>Stage 4</b>	<b>Sampling 2019</b>	Final Harvest and CCS results – 11 <sup>th</sup> of September 2019
<b>Stage 5</b>		
<b>Stage 6</b>		

### **Project Trial site details**

<b>Trial Crop:</b>	Sugarcane
<b>Variety: Rat/Plt:</b>	Plant Q208 2016
<b>Trial Block No/Name:</b>	B# 1-2 F# 0848A Mill By-product sub-surface applied
<b>Trial Block Size Ha:</b>	22.3 ha
<b>Trial Block Position (GPS):</b>	Refer to google earth map
<b>Soil Type:</b>	shallow loam overlying a sodic clay

## Block History, Trial Design:

		Northern End																							
300 m ↔	Edge of field	Buffer Rows		T1 - R1 Control	T2 - R1 Mud Banded at 50	Not treated	T4 - R1 Mud Broadcast at	T5 - R1 Ash Banded at 50	Not treated	Not treated	Not treated	Not treated	Not treated	T2 - R2 Mud Banded at 50	T4 - R3 Mud Broadcast at	T5 - R2 Ash Banded at 50	T1 - R3 Control	Not treated	Not treated	Not treated	T5 - R3 Ash Banded at 50	Not treated	T1 - R3 Control	T4 - R3 Mud Broadcast at	Buffer Rows
		Flume	Flume	Flume	Flume																				
600 m ↔	Edge of field	Buffer Rows		T1 - R1 Control	T2 - R1 Mud Banded at 50 t/ha	T3 - R1 Mud Banded at 100 t/ha	T4 - R1 Mud Broadcast at 200 t/ha	T5 - R1 Ash Banded at 50 t/ha	T6 - R1 Ash Banded at 100 t/ha	Missed treatment (ran out of ash) suppos	T3 - R2 Mud Banded at 100 t/ha	T7 - R2 Ash Broadcast at 200 t/ha	T2 - R2 Mud Banded at 50 t/ha	T4 - R2 Mud Broadcast at 200 t/ha	T5 - R2 Ash Banded at 50 t/ha	T1 - R2 Control	T6 - R2 Ash Banded at 100 t/ha	T3 - R3 Mud Banded at 100 t/ha	Missed treatment (ran out of ash) suppos	T2 - R3 Mud Banded at 50 t/ha	T5 - R3 Ash Banded at 50 t/ha	T7 - R3 Ash Broadcast at 200 t/ha	T1 - R3 Control	T4 - R3 Mud Broadcast at 200 t/ha	Buffer Rows
		6 rows	6 rows	6 rows	6 rows	6 rows	6 rows	6 rows	6 rows	6 rows	6 rows	6 rows	6 rows	6 rows	6 rows	6 rows	6 rows	6 rows	6 rows	6 rows	6 rows	6 rows	6 rows	6 rows	6 rows
		240 m ↔																							
		<p>*Note - T7R1 and T6R3 are missing due to running out of ash</p> <p>*Note - Some treatments only run to the cross drain, while some extend all the way through to the northern end of the field</p>																							

### Block History:

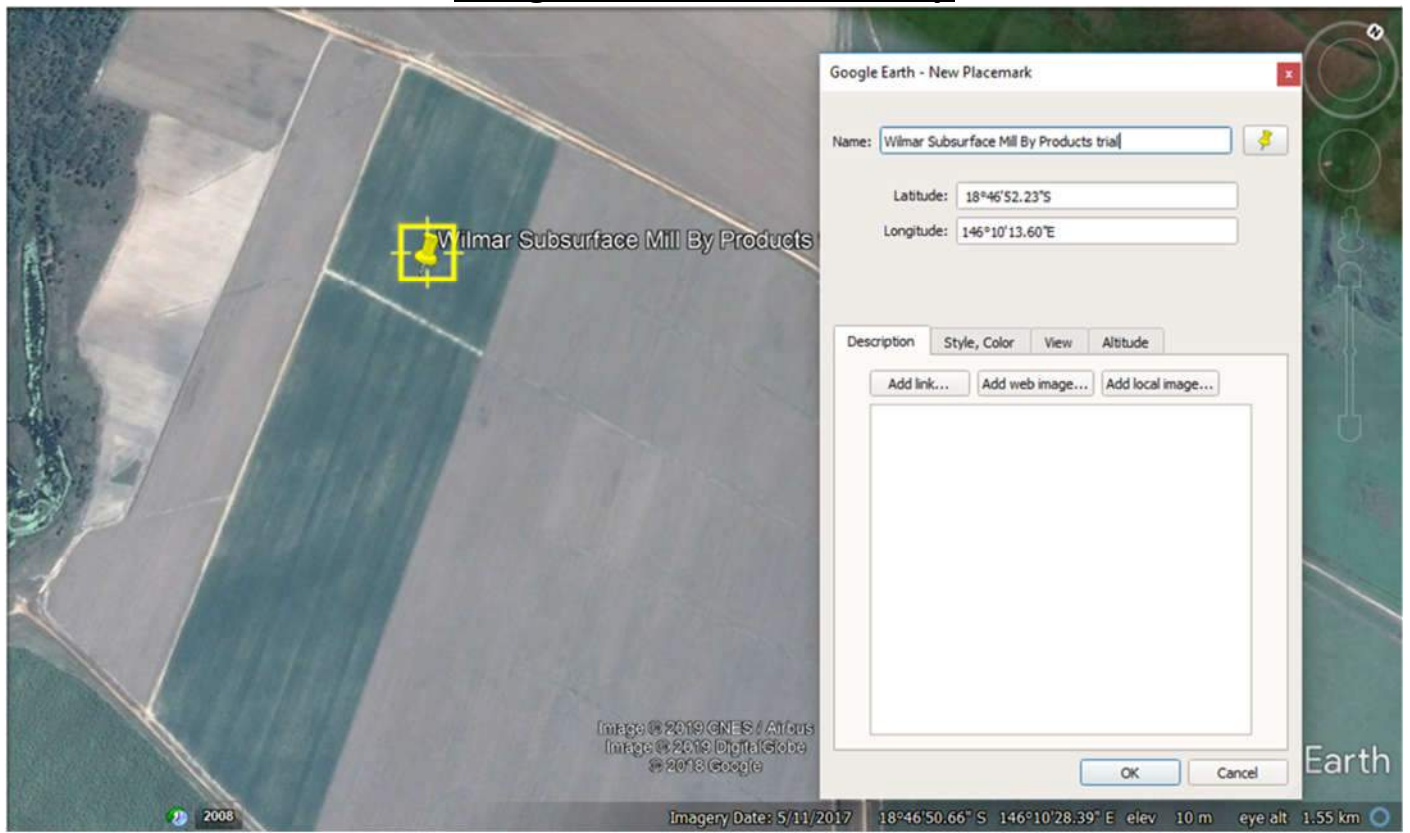
Previous variety MQ239, only went to 2R  
Last fallowed - 2016

### Treatments:

- T1 Control
- T2 Mud Banded 50 t/ha
- T3 Mud Banded 100 t/ha
- T4 Mud Broadcast 200t/ha
- T5 Ash Banded 50 t/ha
- T6 Ash Banded 100 t/ha
- T7 Ash Broadcast 200 t/ha

## Results:

### Google Earth reference Map



### 2017 Season Results

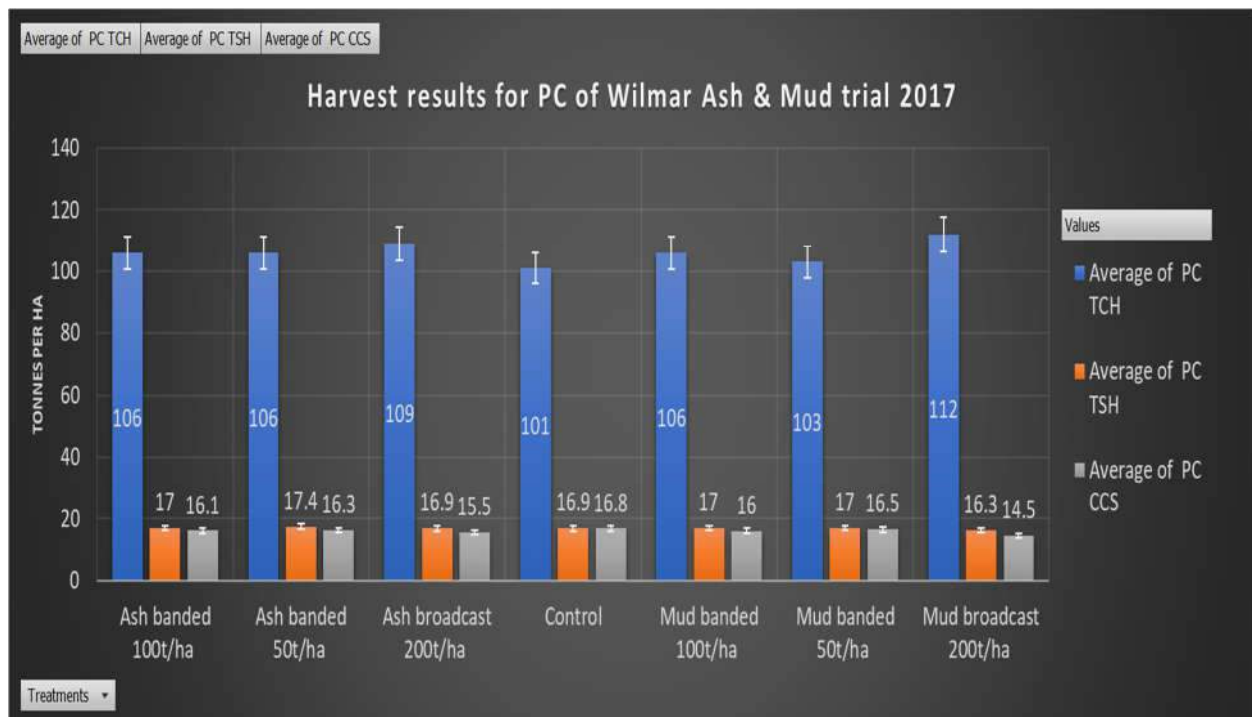
## 2017 Economic results

Treatment	Average TCH	Average TSH	Average CCS	Average Revenue	Average total expense*	Average gross margin
Control	101.0	16.9	16.8	\$ 4,711	\$ 1,178	\$ 3,532
Mud banded 50t/ha	102.9	17.0	16.5	\$ 4,706	\$ 1,218	\$ 3,488
Mud banded 100t/ha	105.5	16.9	16.0	\$ 4,636	\$ 1,491	\$ 3,144
Mud broadcast 200t/ha	112.5	16.3	14.5	\$ 4,316	\$ 2,054	\$ 2,262
Ash banded 50t/ha	106.4	17.4	16.3	\$ 4,792	\$ 1,250	\$ 3,543
Ash banded 100t/ha	105.3	16.9	16.1	\$ 4,637	\$ 1,490	\$ 3,147
Ash banded 200t/ha	108.9	16.8	15.5	\$ 4,560	\$ 2,022	\$ 2,538

\*Cost of ameliorant, land prep, harvesting

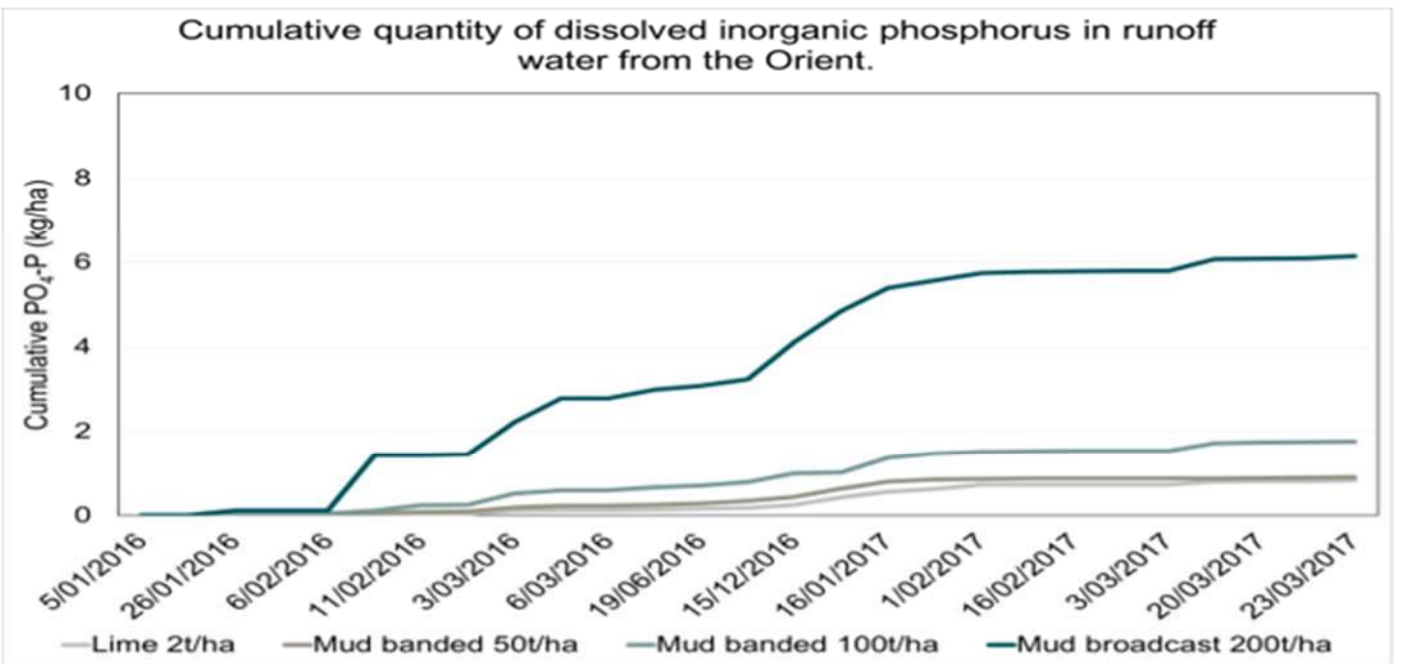
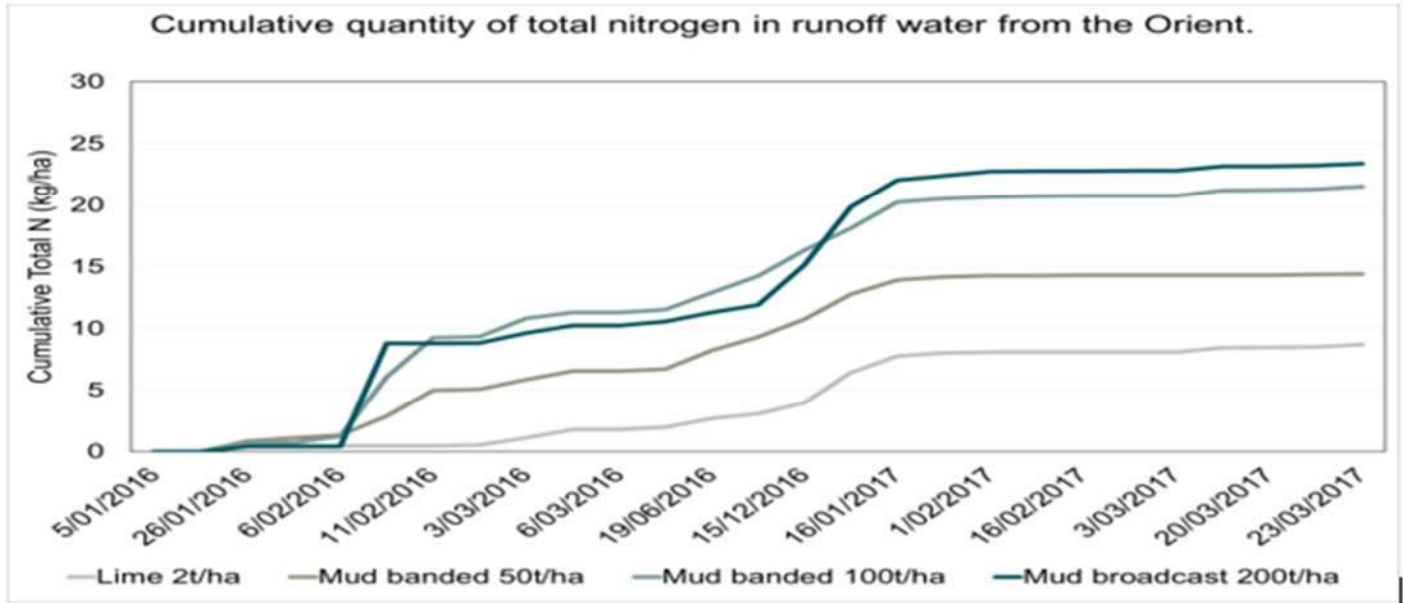
<b>Sugar price</b>	400 \$
<b>Constant</b>	0.6353
<b>Levies</b>	0.518 \$/t
<b>Harvesting cost</b>	8.5 \$/t
<b>Mud cost/t delivered</b>	5 \$/t
<b>Ash cost/t delivered</b>	5 \$/t
<b>Lime</b>	134 \$/t
<b>Extra operation cost</b>	40 \$/ha

## Yield & Sugar Data for Plant Cane 2017





## Water Quality Data for 2017 - Mud treatments

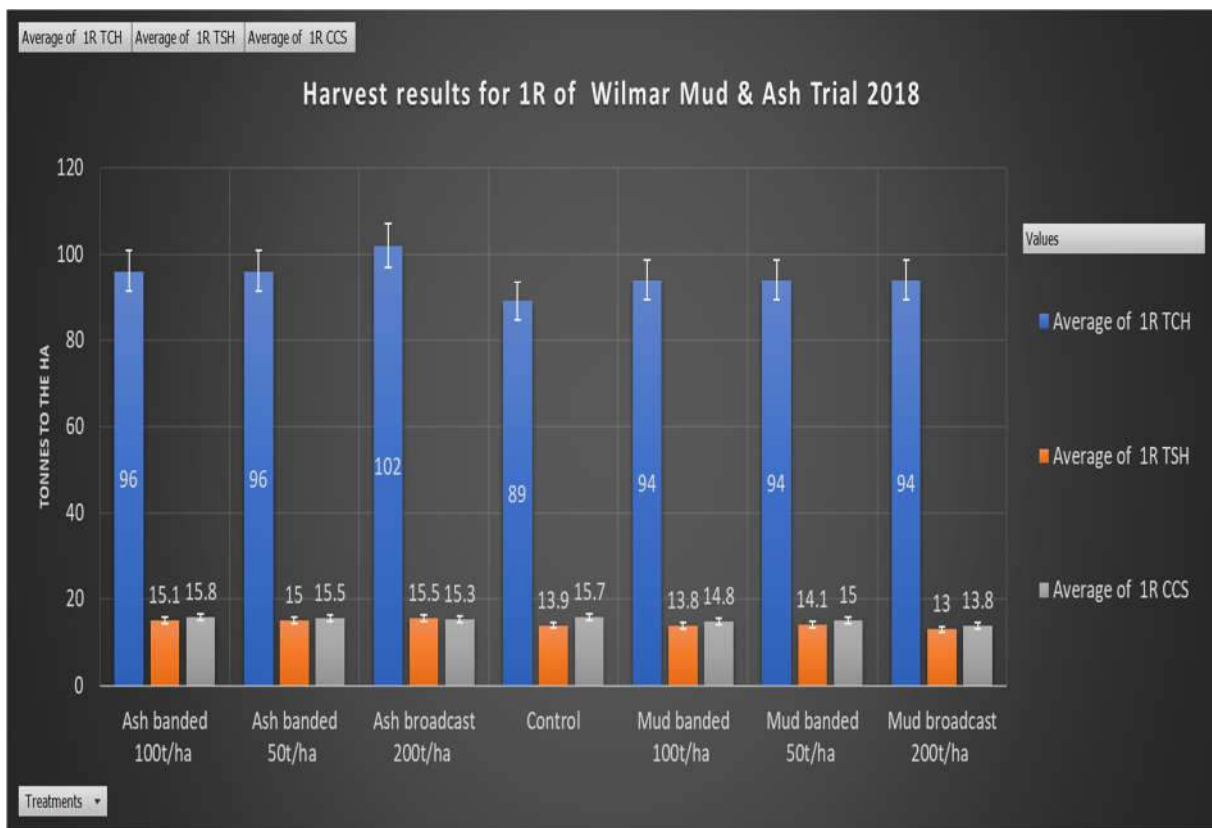


## 2018 Season Results

### 2018 Economic results

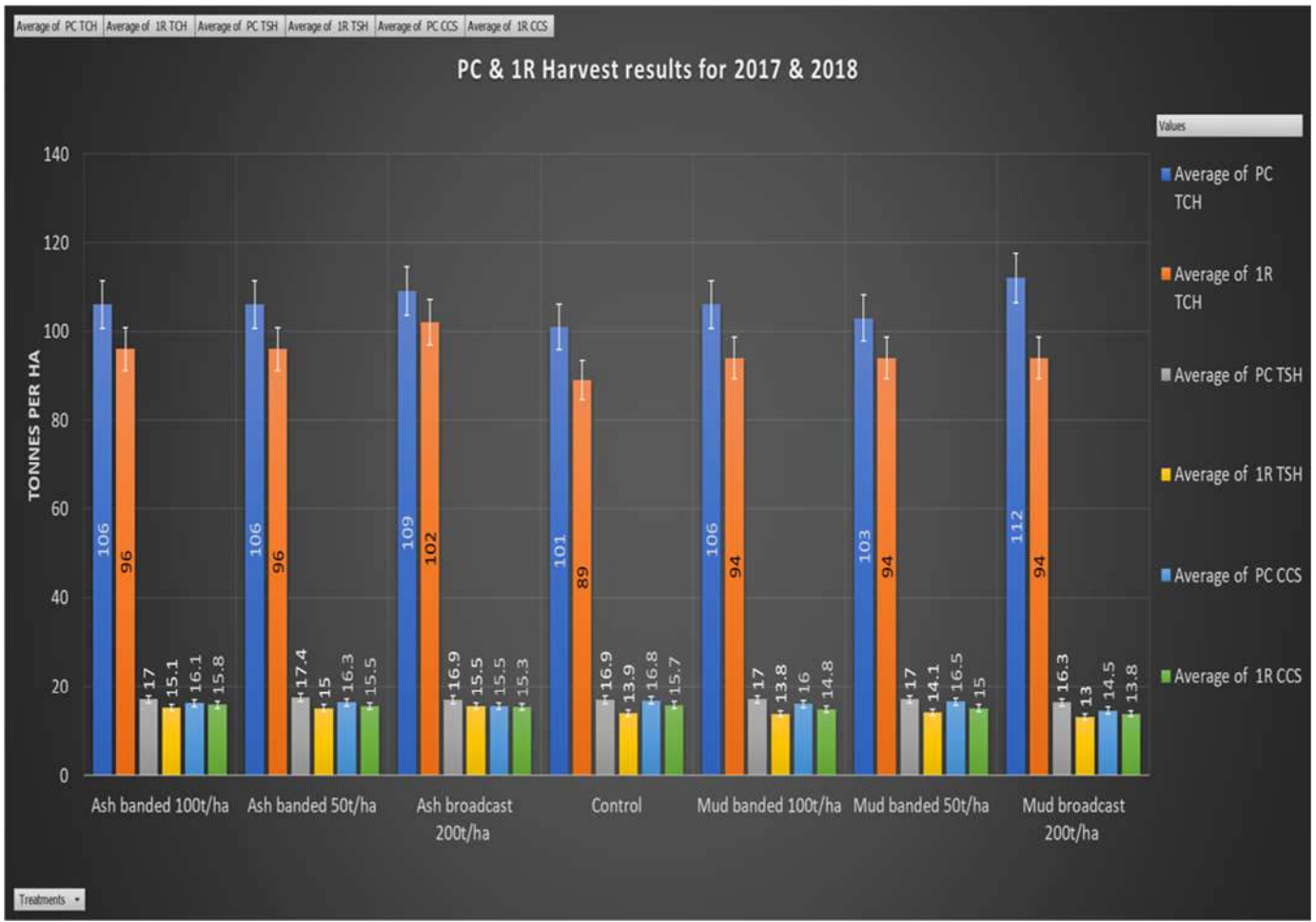
Treatments	CCS		TCH		TSH		Revenue to date	Total extra expenses to date	Gross margins to date
	PC	1R	PC	1R	PC	1R	PC & 1R	PC & 1R	PC & 1R
Control	16.8	15.7	101	89	16.9	13.9	\$8,512	\$1,843	\$6,669
Mud banded 50t/ha	16.5	15	103	94	17	14.1	\$8,498	\$2,201	\$6,297
Mud banded 100t/ha	16	14.8	106	94	17	13.8	\$8,345	\$2,474	\$5,871
Mud broadcast 200t/ha	14.5	13.8	112	94	16.3	13	\$7,715	\$3,040	\$4,675
Ash banded 50t/ha	16.3	15.5	106	96	17.4	15	\$8,852	\$2,254	\$6,598
Ash banded 100t/ha	16.1	15.8	106	96	17	15.1	\$8,781	\$2,254	\$6,289
Ash broadcast 200t/ha	15.5	15.3	109	102	16.9	15.5	\$8,775	\$3,077	\$5,698

### 2018 Yield & Sugar Data for 1<sup>st</sup> Ratoon





## Plant Cane & 1<sup>st</sup> Ratoon summary of Yield and Sugar Data

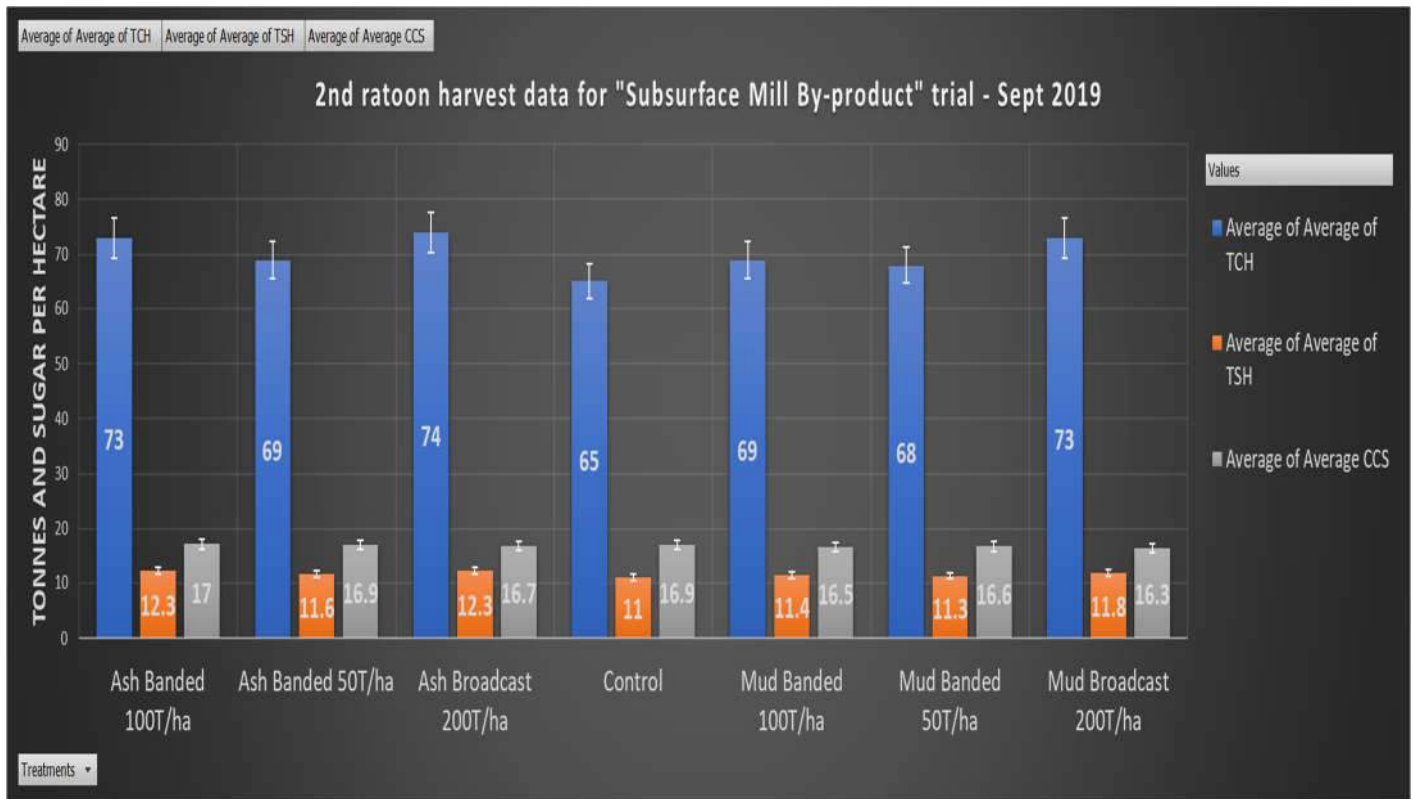


## 2019 Season Results

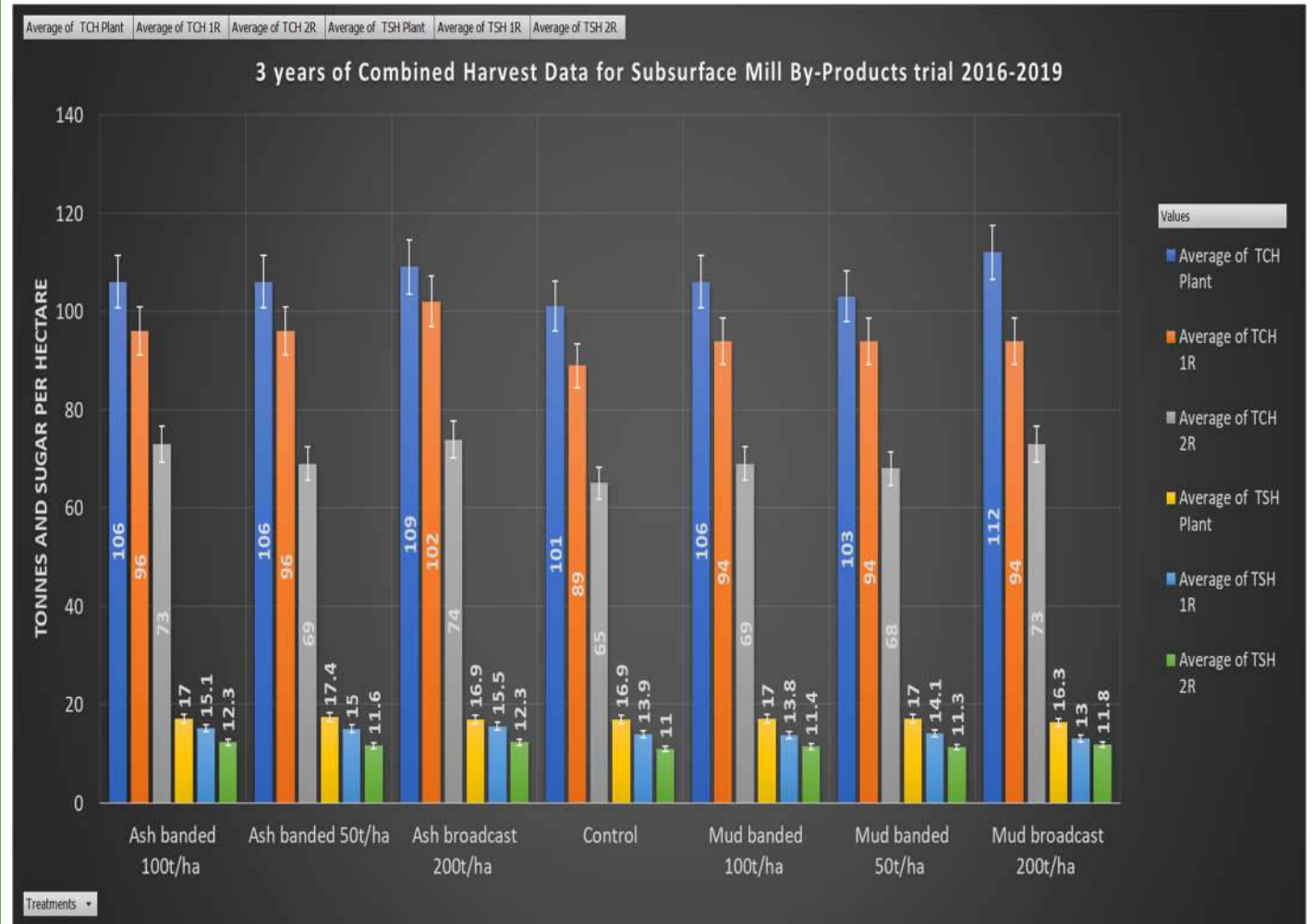
### 2019 Economic Results for 2R crop

Treatments	Average of TCH	Average of TSH	Average CCS	Average Revenue \$\$	Average Gross Margin \$\$
Control	65	11	16.9	3064	976
Mud Banded 50T/ha	68	11.3	16.6	3139	1025
Mud Banded 100T/ha	69	11.4	16.5	3146	1024
Mud Broadcast 200T/ha	73	11.8	16.3	3255	1098
Ash Banded 50T/ha	69	11.6	16.9	3240	1118
Ash Banded 100T/ha	73	12.3	17	3443	1286
Ash Broadcast 200T/ha	74	12.3	16.7	3426	1260

### 2019 Harvest results. 2nd Ratoon data



## Combined harvest data over 3 year



## Conclusions and comments

**2017 & 2018 Conclusion:** The trial has two years of harvest and economic data currently. So far, the data suggested that 50T/ha of either Mud or Ash is the sweet spot for gaining results in yield and sugar per hectare as well as being economically sound. The water quality data suggests that there is a greater reduction in nitrogen and phosphorus runoff at 50t/ha banded compared to the conventional practice of 200t/ha broadcast. To summarise the data so far, it would predict that 50t/ha banded subsurface can be achieved, have benefits to the crop and be an economically sound practice.

**2019 Conclusion:** The trial results suggest to date that between 50T/ha and 100T/ha banded of either the mud or ash products are the sweet spot for yield, sugar and economic value. The control plots are statistical down compared to the other treatments that had mill by-product applied. There is potential for the rate of mill by-products to be reduce without negatively effecting yield and with positive effects to sugars. This mean that areas that normally wouldn't get access to mill by-products can now potentially utilise this great organic product for the industry. There are positive outcomes for water quality coming from the block as well.

Overall this trial has been successful in water quality outcomes. Improving yield compared to the control treatments.

Improving sugar with lower rates of product. Also transport cost of mill by-products can be reduced and even get mill by-products farther around the district, not just zones around the mill area due to transport costs.

**Advantages of this Practice Change:**

Banding mill by-products via sub-surface application reduces the rate that it is applied, reducing the amount of nitrogen and phosphorous applied to the paddock, thus reducing the amount of these nutrients that may leave the farm in run off. This is especially important considering the proximity of the Herbert river catchment to the Great Barrier Reef.

Traditionally, only growers that are close to the mill can afford mill by-product applications due the high rate that it is applied and the wet weight of the product. By banding mill by-products subsurface into the planting line, rates can be reduced. This may increase the number of growers that will be able to afford mill by-product applications.

**Disadvantages of this Practice Change:**

There still needs to be more work done on applying the product subsurface. There were initial issues with getting the mud and ash deep enough into the soil.

**Will you be using this practice in the future?**

Yes, but refining the application equipment still needs on going work.

**% of farm you would be confident to use this practice:**

The Orient farm in the Herbert region has taken to using mill by-product on the plant block. Due to sodic soil issues, this is still a hard area to farm, but with the use of mill by-products, Wilmar are hoping to get longer ratoon life for the cane cycles.