

# Project Catalyst Trial Report

## Liquid v Solids Fertiliser and Water Quality Outcomes

### Grower Information

Grower Name:	Warren Viero
Entity Name:	VIERO DH ATF VIERO TRUS
Trial Farm No/Name:	BKN-06058A
Mill Area:	Burdekin - Pioneer
Total Farm Area ha:	82.82 (has two other farms not included)
No. Years Farming:	10+
Trial Subdistrict:	Aerodrome
Area under Cane ha:	82.82 (has two other farms not included)

Status: Completed

## **Background Information**

**Aim:** To investigate and compare liquid subsurface (stool spilt), granular subsurface (stool spilt) and granular subsurface (side dress) applied fertilisers and determine productivity and water quality outcomes.

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

Since the late 1990s, stool splitting fertiliser has become the standard practice on the heavier soils of the BRIA. In some cases, this practice has also become appealing to growers in the delta due to convenience. However, it does raise some concerns on the delta's lighter soils and especially on those that have a history of soakage issues. Stool splitting with granular and liquid fertilisers will be investigated and compared against the delta's standard practice of side dressing.

**Potential Water Quality Benefit:**

Water quality results will benefit decision making of product form and application method in the future.

**Expected Outcome of Trial:**

As the soil type of the trial site is a loam and has had soakage issues in the past, this may favour the side dress treatment in terms of yield. However, this is highly dependent on rainfall patterns during crop growth. The fertiliser form and application method that will deliver the better water quality outcome is therefore unclear.

**Service provider contact:** Heidi Hatch (ph: 0448 621 994 or [heidih@farmacist.com.au](mailto:heidih@farmacist.com.au))

**Where did this idea come from:** The grower (Warren Viero)

<b>Plan - Project Activities</b>	<b>Date : (mth/year to be undertaken)</b>	<b>Activities :(breakdown of each activity for each stage)</b>
<b>Stage 1</b>	<b>June – Sep 2019</b>	<ul style="list-style-type: none"> <li>- Block selection</li> <li>- Design trial and contact suppliers.</li> </ul>
<b>Stage 2</b>	<b>Sep 2019</b>	<ul style="list-style-type: none"> <li>- Implement trial and install water quality monitoring equipment</li> </ul>
<b>Stage 3</b>	<b>Sep 2019 – Mar 2020</b>	<ul style="list-style-type: none"> <li>- Collect water samples from irrigations and rainfall events</li> <li>- Monitor treatments for any visual differences.</li> </ul>
<b>Stage 4</b>	<b>Mar 2020 – June 2020</b>	<ul style="list-style-type: none"> <li>- Compile and analyse water quality data</li> </ul>
<b>Stage 5</b>	<b>Jun 2020 – Dec 2020</b>	<ul style="list-style-type: none"> <li>- Harvest trial</li> <li>- Analyse data</li> </ul>

### **Project Trial site details**

<b>Trial Crop:</b>	Sugarcane
<b>Variety: Rat/Plt:</b>	3R Q252
<b>Trial Block No/Name:</b>	BKN-06058A-03-01
<b>Trial Block Size Ha:</b>	20.64ha
<b>Trial Block Position (GPS):</b>	-19.587844° 147.317035°
<b>Soil Type:</b>	Loam - BUfc

## Block History, Trial Design:

### Paddock History:

- Predominately loam with lighter lenses throughout
- Was harvested as 3rd ratoon Q252 in 2020
- Rice was planted in the fallow 5 years ago approx.
- Has had some soakage issues in the past

### Trial Implementation:

- Three treatments by four replications as a randomised field strip trial.
- The trial fertiliser products were all applied on 16<sup>th</sup> September 2019 (12 days after harvest).
- As the granular side-dress applicator cultivated the interrow, this was also done to the other two treatments.
- Six KP automatic water event samplers were installed on 23<sup>rd</sup> September prior to the first irrigation post fertiliser application.



- Six irrigation and 4 rainfall events were collected.
- G-Dot moisture probes were installed in a stool spilt and side dress treatment to determine if soakage is achieved.

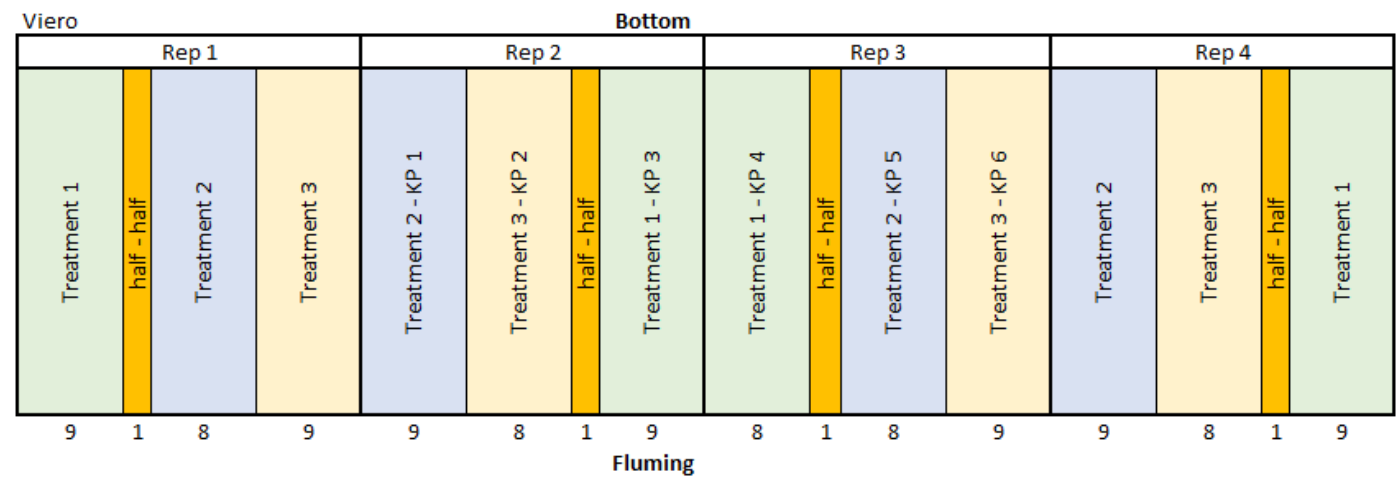
**Treatments:**

All treatments target nutrient breakdown: 175N 12P 72K 18S

**Trial Treatments:**

Treatment	Fertiliser Form	Applicator	Date Applied
T1	Granular	Side dress (sub-surface application)	16/09/2019
T2	Granular	Stool spilt (sub-surface application)	16/09/2019
T3	Liquid	Stool spilt (sub-surface application)	16/09/2019

**Trial layout:**



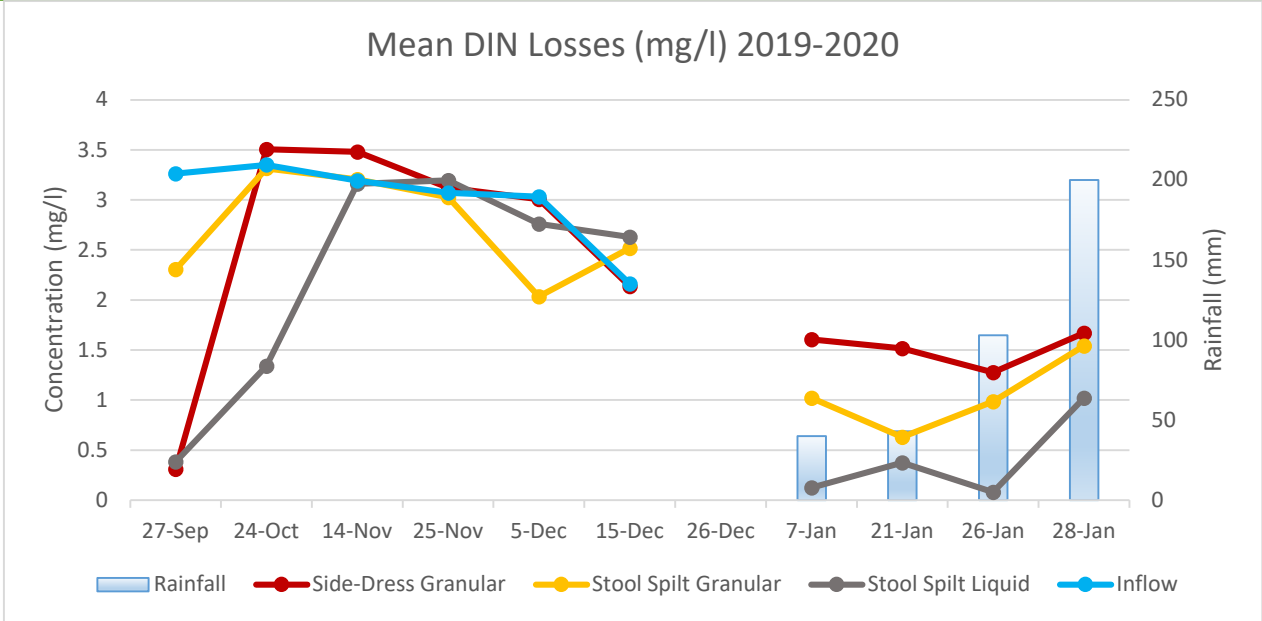
## Results:

### Water Quality:

A total of six irrigation events and four rainfall events were captured using KP samplers. Individual samples were collected and analysed from two replicates of each treatment as shown in the trial map above. Total nitrogen as N concentration was analysed including ammonium nitrogen, oxidised nitrogen and total Kjeldahl. Event dates are detailed below.

Event	Date	Run Time (hrs)
1 <sup>st</sup> Irrigation	27/09/2019	28
2 <sup>nd</sup> Irrigation	24/10/2019	19.5
3 <sup>rd</sup> Irrigation	14/11/2019	12
4 <sup>th</sup> Irrigation	25/11/2019	12
5 <sup>th</sup> Irrigation	05/12/2019	8.5
6 <sup>th</sup> Irrigation	15/12/2019	9
7 <sup>th</sup> Irrigation	26/12/2019	Not collected as limited N in previous events
1 <sup>st</sup> Rainfall	07/01/2020	-
2 <sup>nd</sup> Rainfall	21/1/2020	-
3 <sup>rd</sup> Rainfall	26/1/2020	-
4 <sup>th</sup> Rainfall	28/1/2020	-

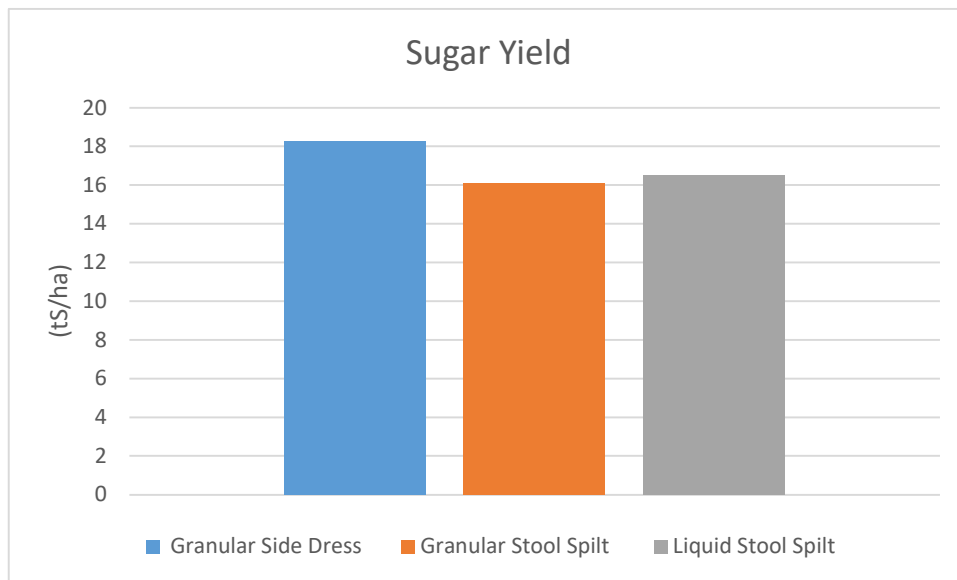
Mean Dissolved Inorganic Nitrogen (DIN) losses as N concentration are shown below for the three treatments (in addition to the irrigation source). DIN includes oxidised and ammonium N. Limited difference was observed between treatments in terms of cumulative results of DIN losses. All treatments follow the typical trend of spiking at either the second or third irrigation. This indicates that there was initially adequate soakage for the stool spilt treatments. This is confirmed by field observations during the first two irrigations and the run times showed above. However, by the 5<sup>th</sup> and 6<sup>th</sup> irrigations the irrigation run times shortened, indicating that the soil had begun to 'seal up' by taking approximately 10-20 hours less. The installed G-Dot moisture probes also indicated limited soakage as the season progressed. Surprisingly, there was no spike from the stool spilt treatments during the first four rainfall events. It must also be noted that the end of paddock N concentrations were similar, if not less than what was being applied as the irrigation water.



Graph 1 - Mean DIN N Losses Concentration

**Yield:**

This trial was harvested towards the end of the season (12-13/11/2020), due to various delays, making the crop 439 days at harvest. When results were analysed at 95% confidence, granular side-dress significantly outperformed both stool-spilt treatments regardless of fertiliser type in terms of cane yield and sugar yield. The average CCS was also higher; however, it was not significant at P=0.05. There was no observed yield difference between the liquid and granular stool spilt treatments.



Treatment	Treatment Description	Cane Yield (tC/ha)	CCS	tSugar/ha
<b>T1</b>	Granular Side Dress	113.8 a	16.06 -	18.28 a
<b>T2</b>	Granular Stool Spilt	102.2 b	15.73 -	16.08 b
<b>T3</b>	Liquid Stool Spilt	104.8 b	15.72 -	16.49 b
<i>Prob (F)</i>		0.601	0.475	0.74

LSD P=0.05

## Conclusions and comments

At this trial site, the granular side dress treatment outperformed both stool-spilt treatments. Considering the loam soil type and history of soakage issues of the paddock, placement had a greater impact on yield than fertiliser type.

### Advantages of this Practice Change (moving to side dress application):

- Increased cane and sugar yield
- At this trail site, there was very little difference in water quality results and run off N concentration was similar, if not less than what was applied as part of the irrigation water.

### Disadvantages of this Practice Change:

- Potential labour increase using a side-dress applicator.

### Will you be using this practice in the future:

In 2020 the liquid stool-spilt applicator was used as this trial was not harvested until late in the season after most of the year's fertilising was already complete. However, moving forward in 2021, the grower has invested in transforming the stool spilt applicator to side dress.

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

All ratoons on this farm will have fertiliser applied with the liquid side dress applicator.