

# Case Study 3

## Werner family, Septimus


 Reef Catchments Action  
 On The Ground Carbon  
 Farming Trial

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Assessment of sub-surface applied mill mud as a component of a seasonal nutrient program in sugarcane

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**Site Location:** Septimus

**Coordinates:** Latitude -21.23503

Longitude 148.77019 (WGS 84)

**Soil profile class:** Gargett

**Aus Soil Classification:** Yellow-gleyed podzolic soil

**Soil profile class:** Dunwold **Aus Soil Classification:** Grey Sodosol

**Variety:** KQ228 **Crop Class:** 1st ratoon

### Trial objectives

- Assess the potential of incorporating banded mill mud applications at low rates as part of seasonal nutrient program for sugarcane
- Assess the potential for mill mud to supply organic nitrogen and other macronutrients while reducing granular nitrogen inputs

### Introduction

The study site paddock of 3.04 hectares has been under sugarcane production for approximately 20 years. The block was planted to the variety KQ228 in August 2010. The plant cane crop was harvested in August 2011 and the 1st ratoon crop was harvested on the 28 June 2012. Mill mud is a by-product of the sugar milling process and traditionally applied at rates in excess of 150 wet tons /ha. To address water quality issues in the Central cane growing region mill mud is now banded at 50 tons/ha with modified truck applicators. The Werner family have developed a single row mill mud applicator with the capacity to sub-surface band apply the product at reduced rates of 30 ton/ha. Sub-surface application banded on either side of the stool would mitigate potential loss through run-off. In addition sub-surface placement of the product would facilitate nutrient cycling of nutrients through beneficial soil organisms. The growers were considering the option of applying



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banded mill mud as a component of an annual nutrient program for sugarcane. The anticipation is to improve nitrogen (N) use efficiency through controlled release of N through mineralisation via the mill mud application with a corresponding reduction of granular urea inputs.

### Methods

To determine the variability in crop growth of the trial block, four years of satellite yield estimation data was transformed into a yield ratio mapping surface using Mapinfo® software. Yield estimation point data for the block was converted into a yield estimate ratio by dividing the actual value for each point by the site average of yield data for those years where the cane class matched Plant, 1st or 2nd ratoons. Patterns in the yield ratio map enabled the positioning of the trial area within the block in where there was the least variability in crop growth (Figure 1).

The trial design incorporated two nutrient treatments with 4 replications. Randomised treatment strips are block length and 6 x 1.8m rows wide. The mill mud was applied on the 15 November 2012 with the balance of the nutrients applied as a granular side-dressing on the 22 November. The granular side-dressing on the conventional nutrient treatment was applied on the 20 November 2012. Table 1 summarises the application of nutrients to each treatment.



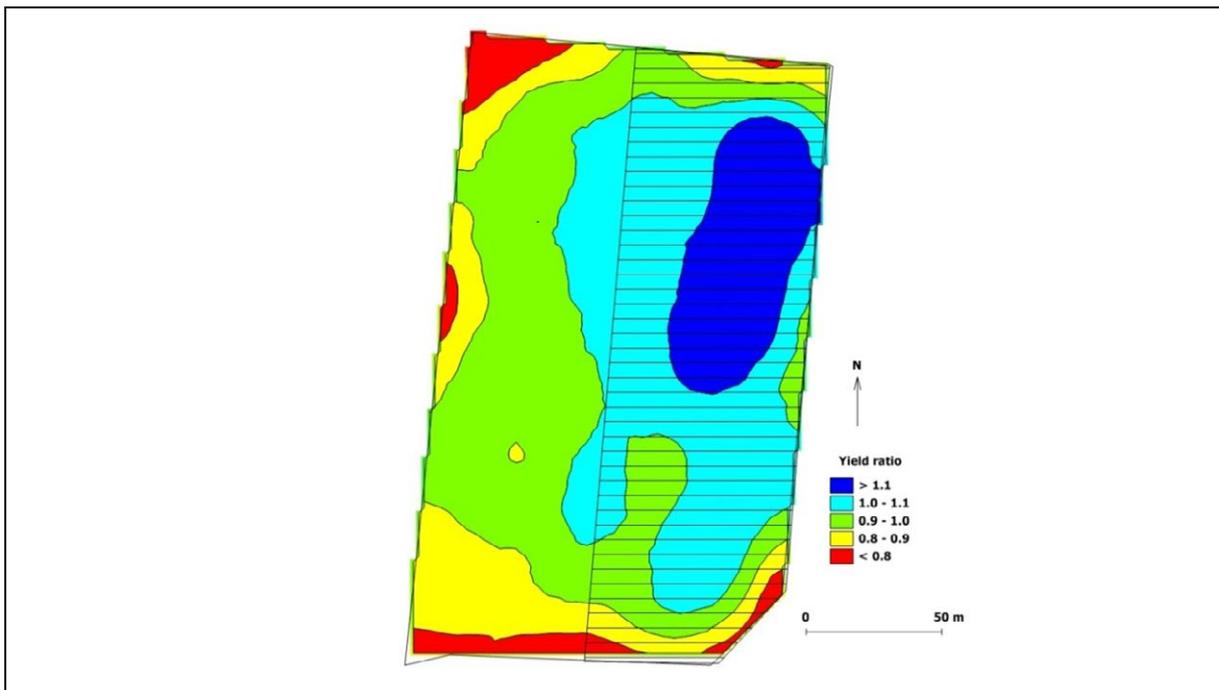
**Table 1: Breakdown of nutrients applied with the mill mud nutrient program and the conventional granular fertilizer program**

Treatments	Rate (kg/ha)	Total nutrients applied (kg/ha)			
		N	P	K	S
<b>T1: Mill mud program</b>	32,700	25	25	15	10
Mill mud banded plus Granular side-dressing (N-26.95%, K-17.9%, S-2.4%)	480	129	0	86	12
<b>Total T1</b>		<b>154</b>	<b>25</b>	<b>101</b>	<b>22</b>
<b>T2: Conventional program</b>	750	<b>158</b>	<b>23</b>	<b>128</b>	<b>45</b>
Granular side-dressing (N-21%, P-3%, K-17%, S-6%)					

The block was irrigated with 40mm on the 28 November. Leaf sampling of treatment replicates was conducted on the 12 February 2013 and the 4 April 2013 respectively. BSES leaf sampling protocols

were followed with 30 leaf samples from each strip extracted from the 2nd and 4th row of the plot. Leaf samples were refrigerated at 4° Centigrade prior to being oven dried at 60° Centigrade for 48 hours. Samples were forwarded to BSES for analysis.

**Figure 1 - Satellite yield ratio mapping layer showing location of trial in section of paddock with the least variability in crop growth**





### Results and discussion

Cane on the trial site was harvested on July 30 2013.

### Discussion Points

- Cane and sugar yields for both treatments are significantly higher than the region average.
- There is no difference in cane and sugar yields between treatments.
- Results to date indicate reducing nitrogen applications in association with alternative nutrient sources (T1) has no impact on cane and sugar yields when compared to the industry standard application (T2).
- There has been a small increase in %OC levels in T1 soils between 2012 and 2013.
- Soil organic carbon levels at the site will continue to be monitored to identify trends.
- Failure to reduce Nitrogen application when used in conjunction with alternative nutrient sources has the potential to reduce water quality, increase Nitrous Oxide emissions and enhance the vigour of weeds.

### Results

#### Soil analysis

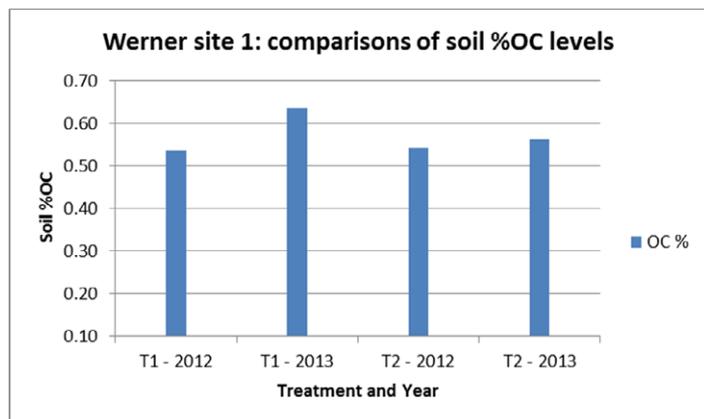


Figure 2 - Werner site 1 Average %OC (2012 and 2013)

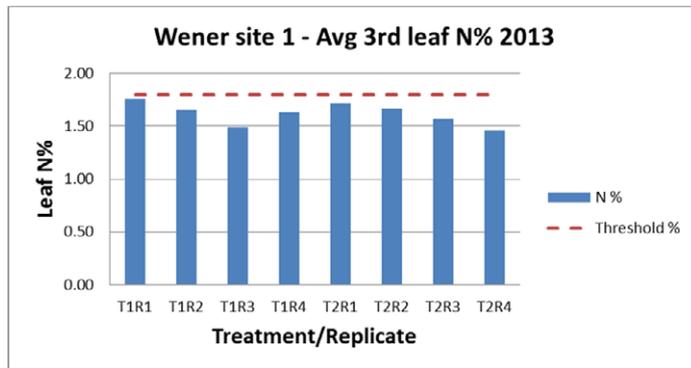


Figure 3 – Werner site 1 – Leaf N% analyses

#### Harvest Results – July 30 2013

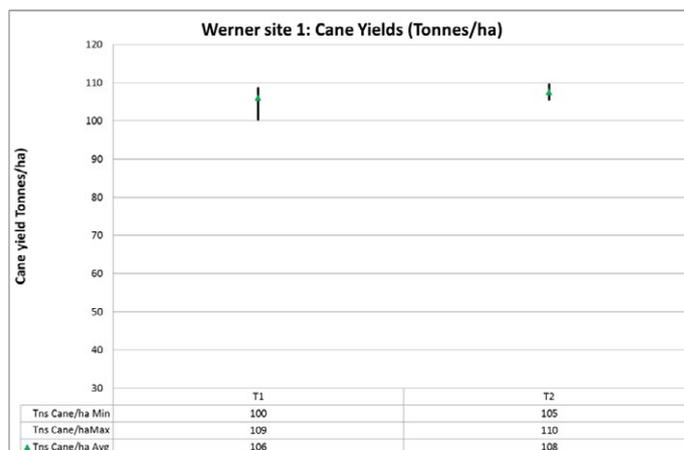


Figure 4 - Werner site 1 Cane yields (tonnes/ha) - showing the average achieved per treatment and the spread between replicates (min to max)

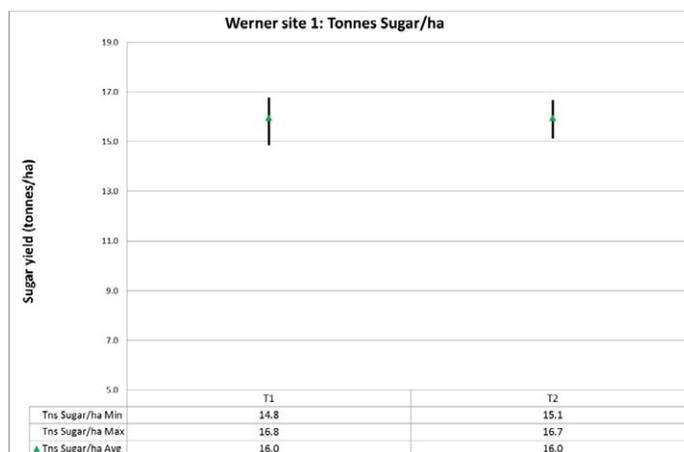


Figure 5 - Werner site 1 Sugar yield (t/ha) - showing the average achieved per treatment and the spread between replicates (min to max)