Trial site, Septimus, Electrical Conductivity (EM) Map

CASE STUDY

BACKGROUND

A 0.27 hectare irrigated area on Dennis Werner's farm in Septimus was chosen for this trial three years ago. Four soil samples were taken across the paddock, with pH values ranging from 4.5 – 4.7.

The trial was established in a highly acidic fallow field (average pH 4.6). Five tonnes of lime was initially added to the predetermined treatments in the first year only, however the nutrient applications were still made each year.

The aim of the trial is to quantify the benefit of liming acidic soils in terms of nitrogen mineralisation and crop yield, with the end goal of reducing nitrogen run off into local aquatic systems.

Soil microbes that transform nitrogen into a plant available form, are sensitive to acidic conditions. With the addition of lime, soil pH is raised which increases soil microbes' nitrogen conversions, which means more nutrients for the plant.

Four treatments were applied in the trial and each treatment was replicated three times.

- 115N rate + tonne/ha lime (control + growers standard practice)
- 30N rate + tonne/ha lime
- 115N rate + nil lime
- 30N rate + nil lime

FOCUS ON

- Investigating if the addition of lime with a nitrogen application will have a beneficial effect on cane yield compared to straight nitrogen applications.

KEY POINTS

- Over the three years of this trial, crop yields from the reduced nitrogen treatments have been equal to the higher nitrogen treatments.
- One of the most promising findings out of the latest harvest results was that 30kg/ha nitrogen application with lime, produced 2.3 t/ha more than a 115kg/ha nitrogen application that had no lime applied. This 85 kg/ha nitrogen reduction, equates to $138/ha in savings.
- Findings suggest that if a grower applies lime, they could consider reducing their nitrogen application rate.

"That one component is not the answer to sustainable agriculture, there are many components that build onto developing sustainable agriculture. Each component adds a percentage to better soil health and sustainability."

– Dennis Werner , Landholder

OUTCOMES TO DATE

2017 results indicated that the addition of lime with a nitrogen application produced better cane and sugar yield than untreated plots. This was due to the higher availability of nutrients in limed soils, as acidic soil conditions are a limiting factor in plant development.

The sugar percentage (CCS) was the only factor that decreased with the lime application. This is likely attributed to the limed treatments utilising the applied nitrogen more efficiently. When sugar cane has access to ample nitrogen for its needs, the plant utilises this energy in a prolonged vegetative stage, with a focus on biomass production, rather than maturing, which is when CCS levels increase the most.

It is important to note that the results were statistically insignificant as there was too much variation between repetitions and treatments. It is likely the variance in results was influenced by the small plot sizes.

It should also be noted that Cyclone Debbie hit the region in March 2017. The strong winds and rainfall experienced during this event would have likely impacted the crop's growth via lodging, waterlogging and destruction of stalks and biomass. This is supported by the large variance in the 115N plots, as these plots would have grown the quickest, making them more susceptible to lodging, due to their height and denser biomass.

Dennis is a third generation farmer, and his son John is a fourth generation farmer. The family first started farming in 1894 near Rosella before moving to Septimus in 1936. It was in 1989 that the family adopted 100% green cane harvested, and were one of the first farms to do so. They have been working closely with Reef Catchments since then in a number of different sustainable agriculture projects.

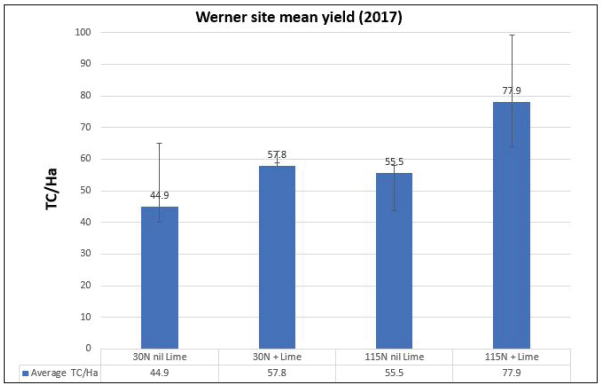
The original Farmacist trial site is still continuing to grow cane where the reduced rates of mill mud application occurred, the standard treated area is currently being fallowed. Leading Australian soil scientist, Dr Graham Sterling, visited the site and took samples regarding soil health, and he will be presenting his findings at the ASCCT conference.

The second Farmacist trial site compared reduced mill mud/ash surface application verses subsurface application. The trial has finished and the block is now continuing with fourth rattoons.

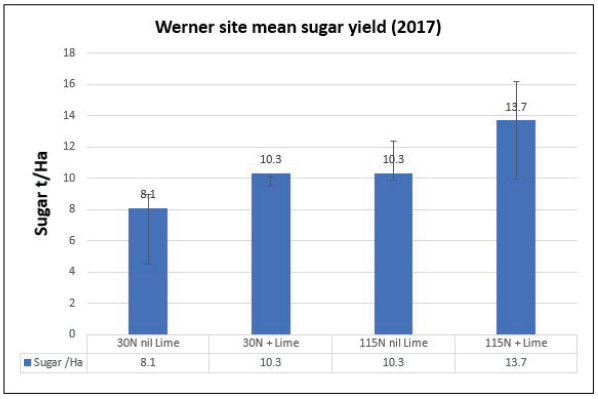
In 2016, they started to plant blocks using reduced rates of mill mud/ash applications and a programmed lime – dolomite application and a stoller based trace element programme.

Row length (m)	Plot	Treatments			Replicate
6	2	4	Buffer	2	
12	Buffer				
6	5	3		1	1
6	6	4		2	
6	7	3		1	
6	Buffer				2
6	9	3		1	
6	Buffer				
6	11	4		2	3
Number of rows		6	13	6	

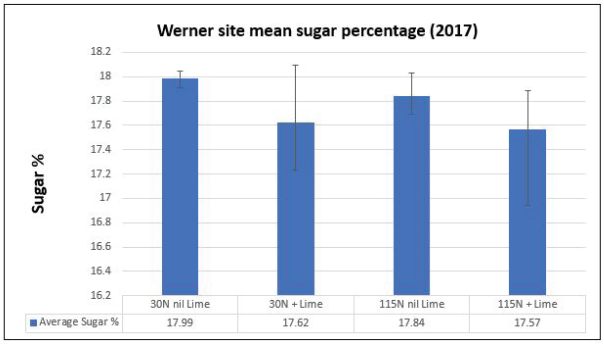
Trial Layout



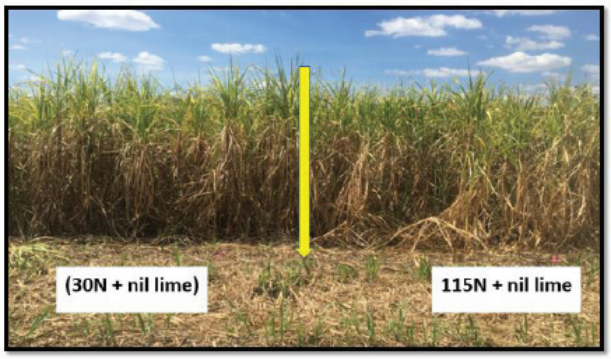
Average cane yield result



Average sugar yield



Average sugar %



Lodged unlime vs limed – lodging in the 155N plot vs normal cane in 30N treatment. Lodging in the high nitrogen rate after Cyclone Debbie, due to denser biomass.

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