Catalyst Project Report

Grower Information	
Grower Name:	John Muscat (Mac)
Entity Name:	
Trial Farm No/Name:	MKY-04621A
Mill Area:	Mackay Sugar
Total Farm Area ha:	50
No. Years Farming:	40
Trial Subdistrict:	Lower Pioneer Catchment
Area under Cane ha:	45

Background Information

Aim: Staggered nitrogen rate application to mitigate crop lodging and CCS reduction on high yield potential soils

Background: (Rationale for why this might work)

A number of growers producing sugarcane on highly productive well drained soils have expressed disappointment in relatively low crop yields and disappointing CCS figures under well-managed, supplementary irrigated farming systems. Nitrogen (N) rate trials conducted during the MOSES and Action on the Ground projects showed that achieving high yields with mill average CCS on productive irrigated soils can be compromised through crop lodging particularly when N rates exceed 6ES guidelines. Case studies indicate that reducing N rates below 6ES guidelines on productive well drained, irrigated soils can reduce lodging with improved CCS levels.

Growers are reluctant to reduce N rates as a management practice due to concerns with potential 'mining 'of N in the organic pool. This experiment will test the potential of alternating N rates (6ES and a lower N rate) in consecutive years over the ratoon cycle to maintain the N in the organic pool while managing crop lodging and improving CCS. A number of growers farming these highly productive soils tend to apply N at above 6ES rates in an attempt to optimise the on the yield potential of these soils.

These productive alluvial soils are well represented along the Pioneer River system and generally have history of mill mud application due to their proximity to sugarcane mills (Racecourse, Marian and Farleigh mills)

Potential Water Quality Benefit:

Reduced nutrient run-off entering the waterways

Expected Outcome of Trial:

Service provider contact: Farmacist

Where did this idea come from: Farmacist/Grower

Plan - Project Activities	Date: (mth/year to be undertaken)	Activities :(breakdown of each activity for each stage)
Stage 1	**July 2016**	Identify site and analyse for uniformity
Stage 2	**September 2016**	Application of treatments
Stage 3	**April 2017**	Monitor leaf and growth
Stage 4	**October 2017**	Harvest site
Stage 5	**October 2017**	Re-apply treatments as per trial design
Stage 6	**April 2018**	Monitor growth and leaf analysis at sites
Stage 7	**October 2018**	Harvest site
Stage 8	**October 2018**	Re-apply treatments as per trial design
Stage 9	**May 2019**	Monitor growth and leaf analysis at sites
Stage 10	**October 2019**	Harvest site

Project Trial site details

Trial Crop:	Sugar cane
Variety: **Rat/Plt:**	Q240 Pl
Trial Block No/Name:	10-3
Trial Block Size Ha:	6.2
Trial Block Position (GPS):	149.105456 -21.155759
Soil Type:	Marian – Brown Chromosol

Block History, Trial Design:

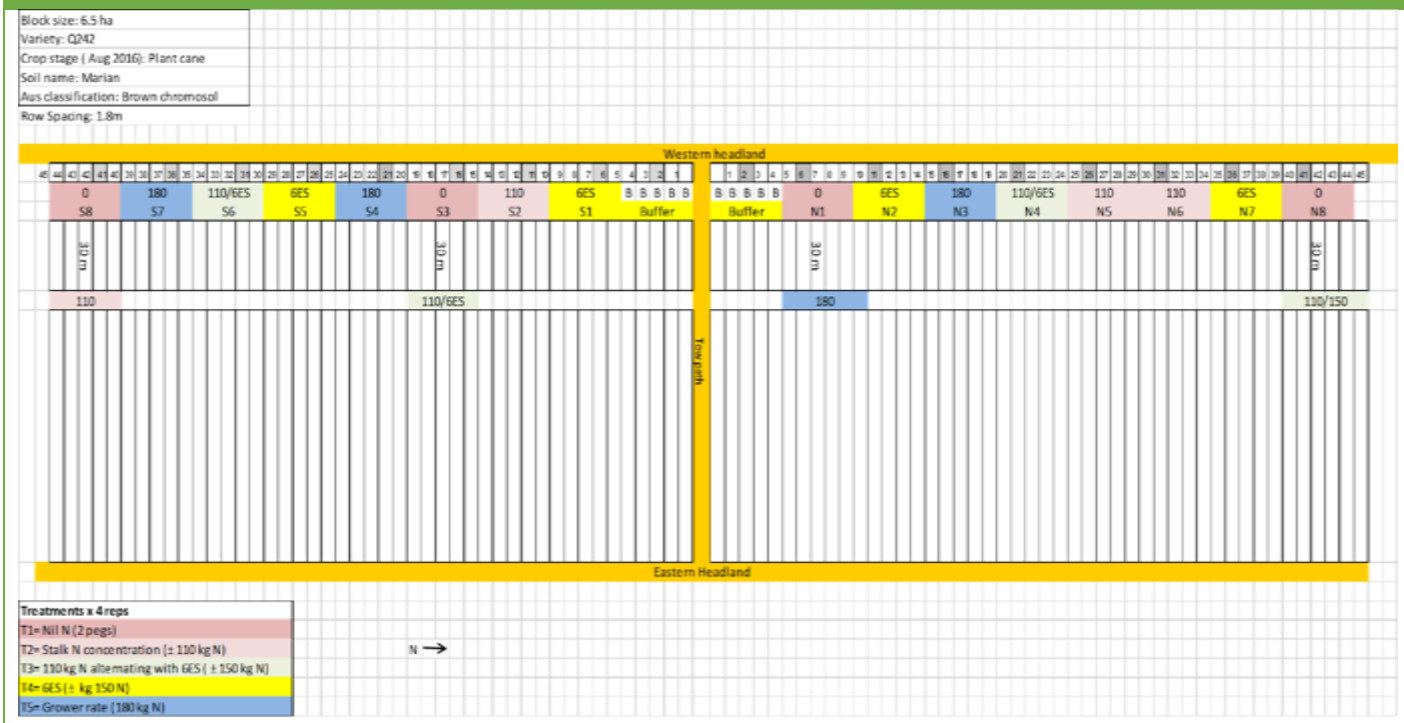

Figure 1 - Trial layout of treatments and repetitions

The layout of the trial can be seen in Figure 1 above, five treatments were repeated four times. The paddock selected was EM mapped to ensure uniformity of the site, to minimise any soil effects on the treatments. An assessment of yield variation (Figure 2) confirmed uniformity in the block with only slight variation between yields in the majority of the block.

Treatments:

- **T1: Nil N**
- **T2: Approximately 110 kg N/ha based on average stalk N concentrations (DSITI trials)**
- **T3: 110 kg N alternating with 6ES in consecutive years over the ratoon cycle**
- **T4: 6ES N rates (incorporating mineralisation index)**
- **T5: Grower rates (180 kg N/ha)**

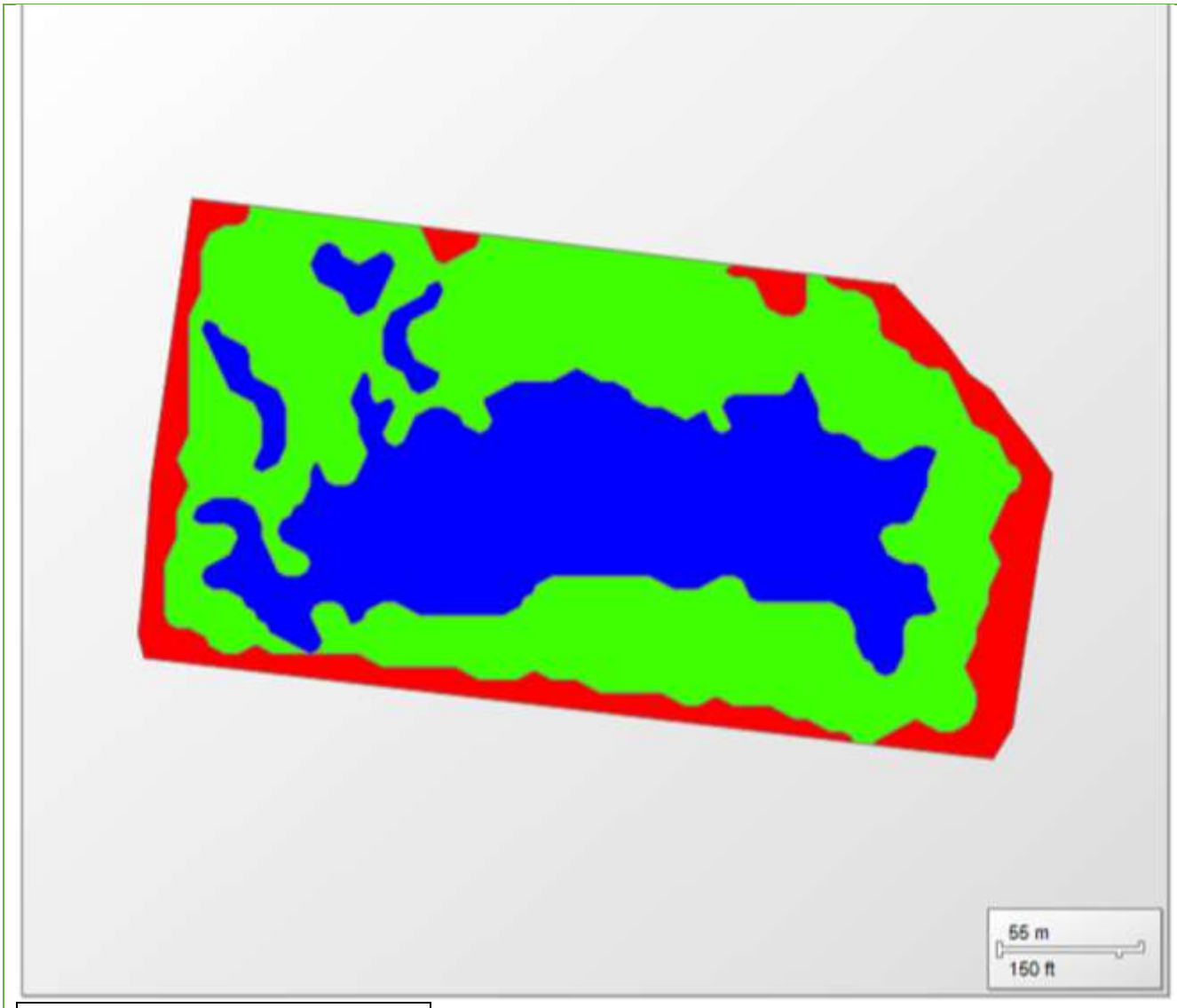

Figure 2 - Yield map of site showing relative uniformity

Results:

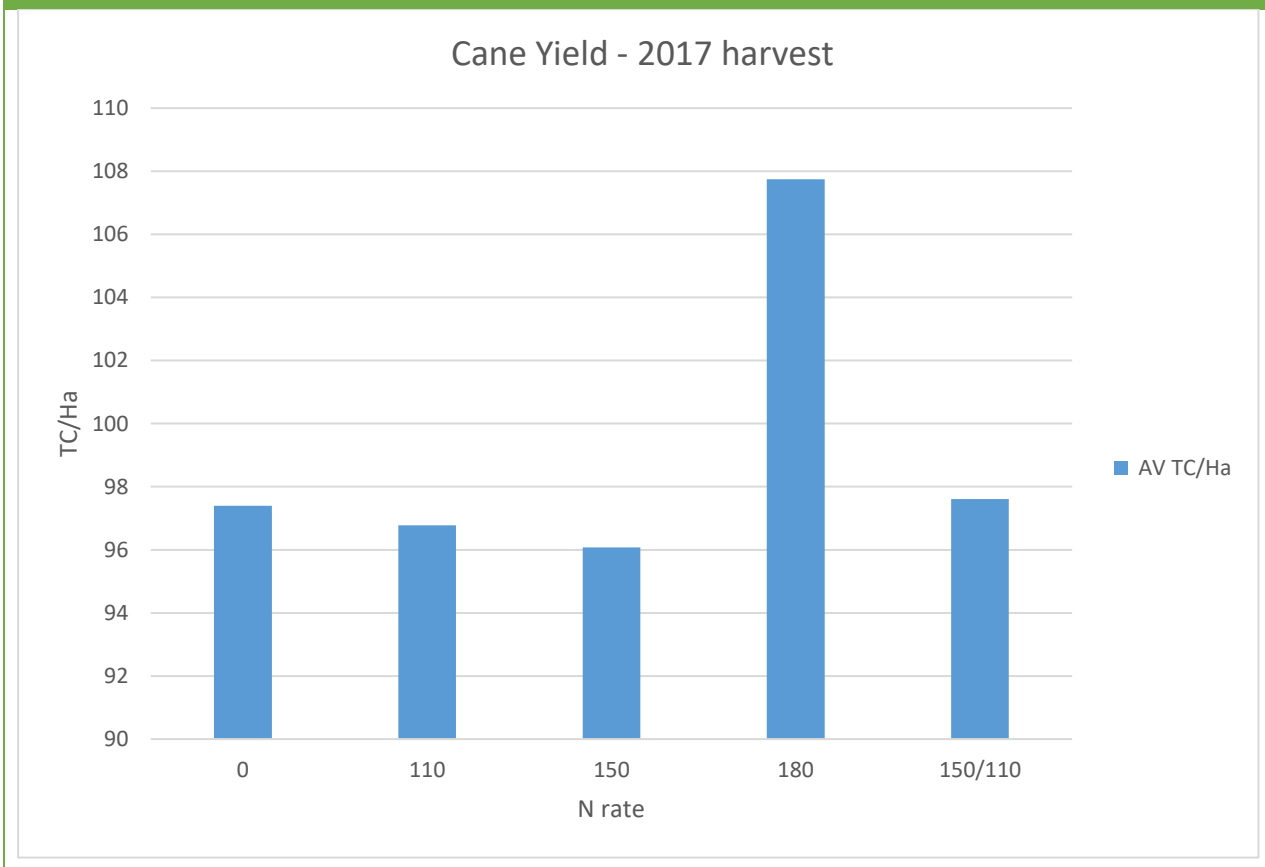

Figure 3 - Cane yield results from 2017 harvest

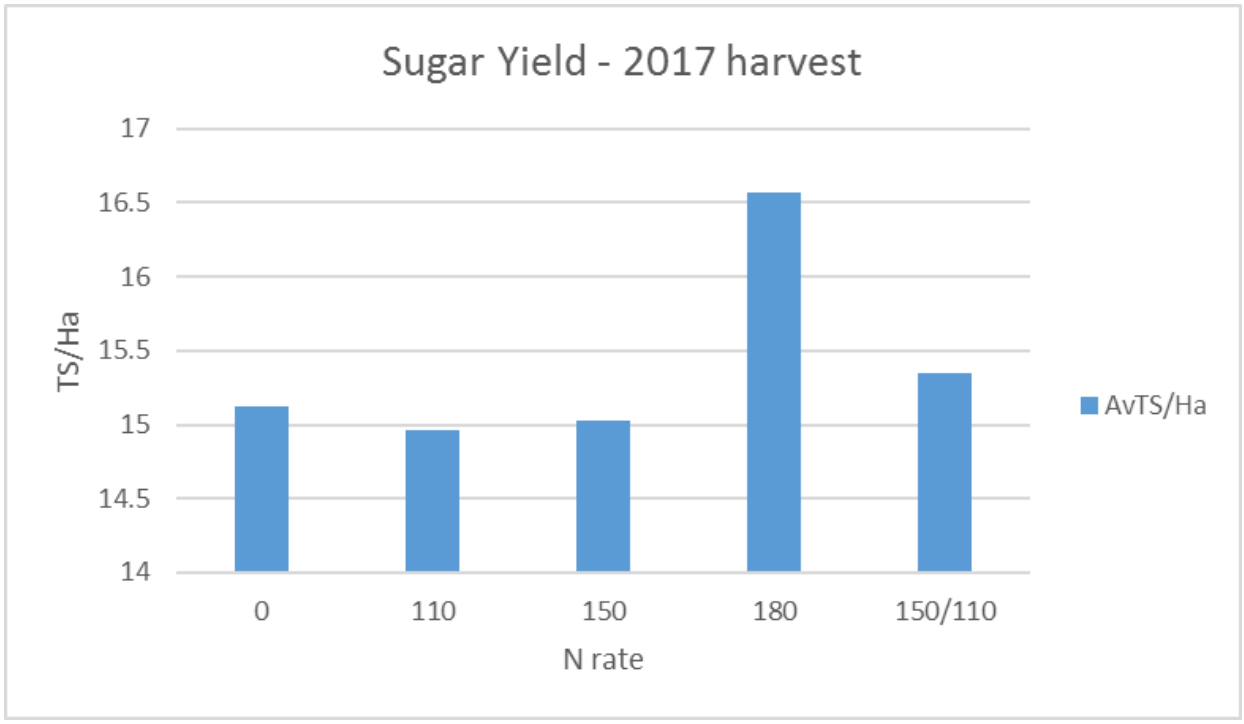

Figure 4 - Sugar yield from 2017 harvest

As shown in Figures 3 and 4, the 180 kgN/ha treatment outperformed the other treatments for the 2017 harvest, however yields for the other treatments all remained relatively similar in yield. It is unclear why the 180 kg/ha N treatment yielded significantly higher than all other treatments.

2018 Harvest Results

Unlike the 2017 harvest, the 2018 yield results all achieved very similar yields across all treatments apart from the zero N treatment which yielded slightly lower than the other treatments (Figure 5). It is assumed that after two years of no N addition the zero plot would be running down the soil nitrogen stores, hence the lower yield. Sugar yields showed the same trend as the cane yield (Figure 6).

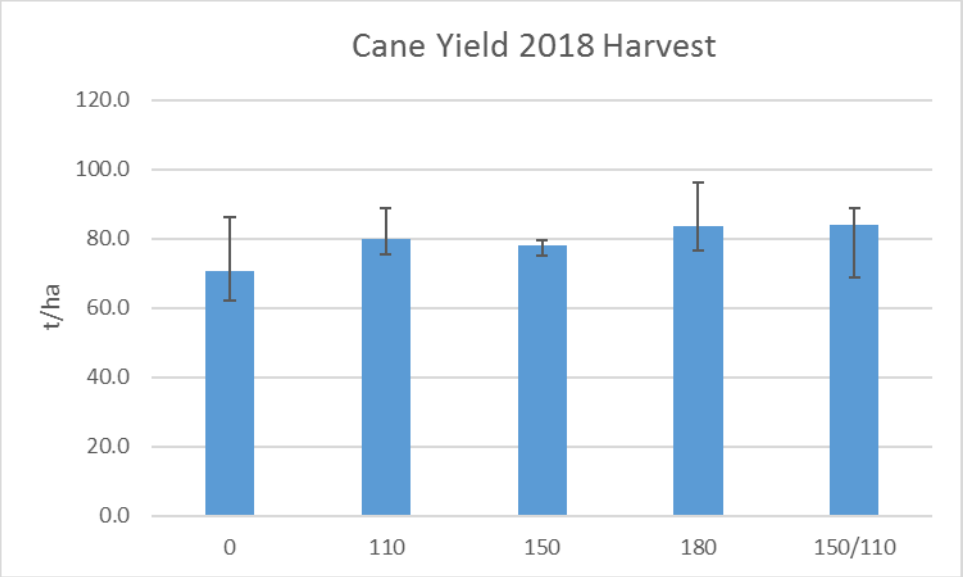

Figure 5 - Cane yield from 2018 harvest

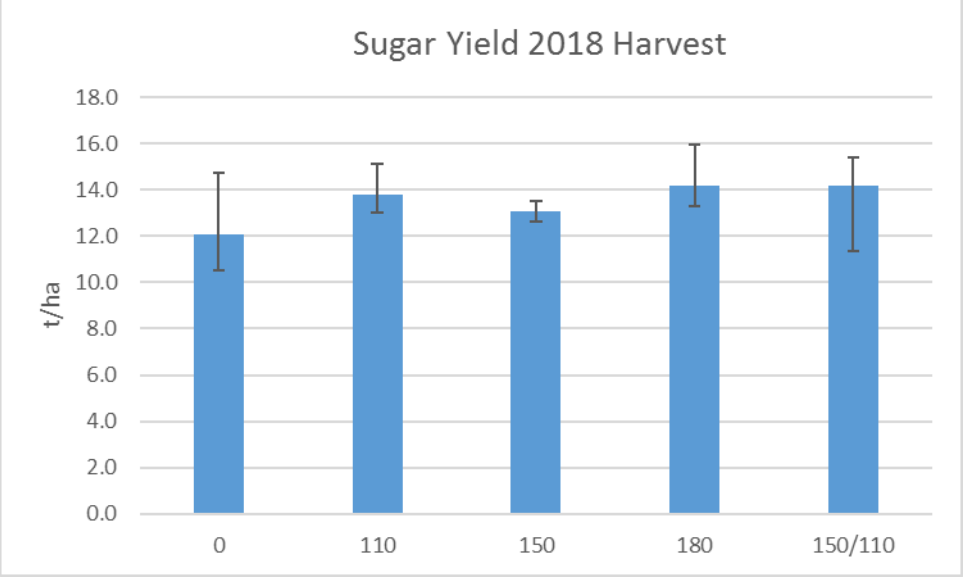

Figure 6 - Sugar yield from 2018 Harvest

Nitrogen uptake closely followed the trend of the applied nitrogen rates, slightly increasing from 0 to 110 to 150 (Figure 7). The 180 kg N/ha treatment was the same as the 150 kg N/ha treatment indicating that although extra nitrogen was applied, it was not utilised or stored by the crop.

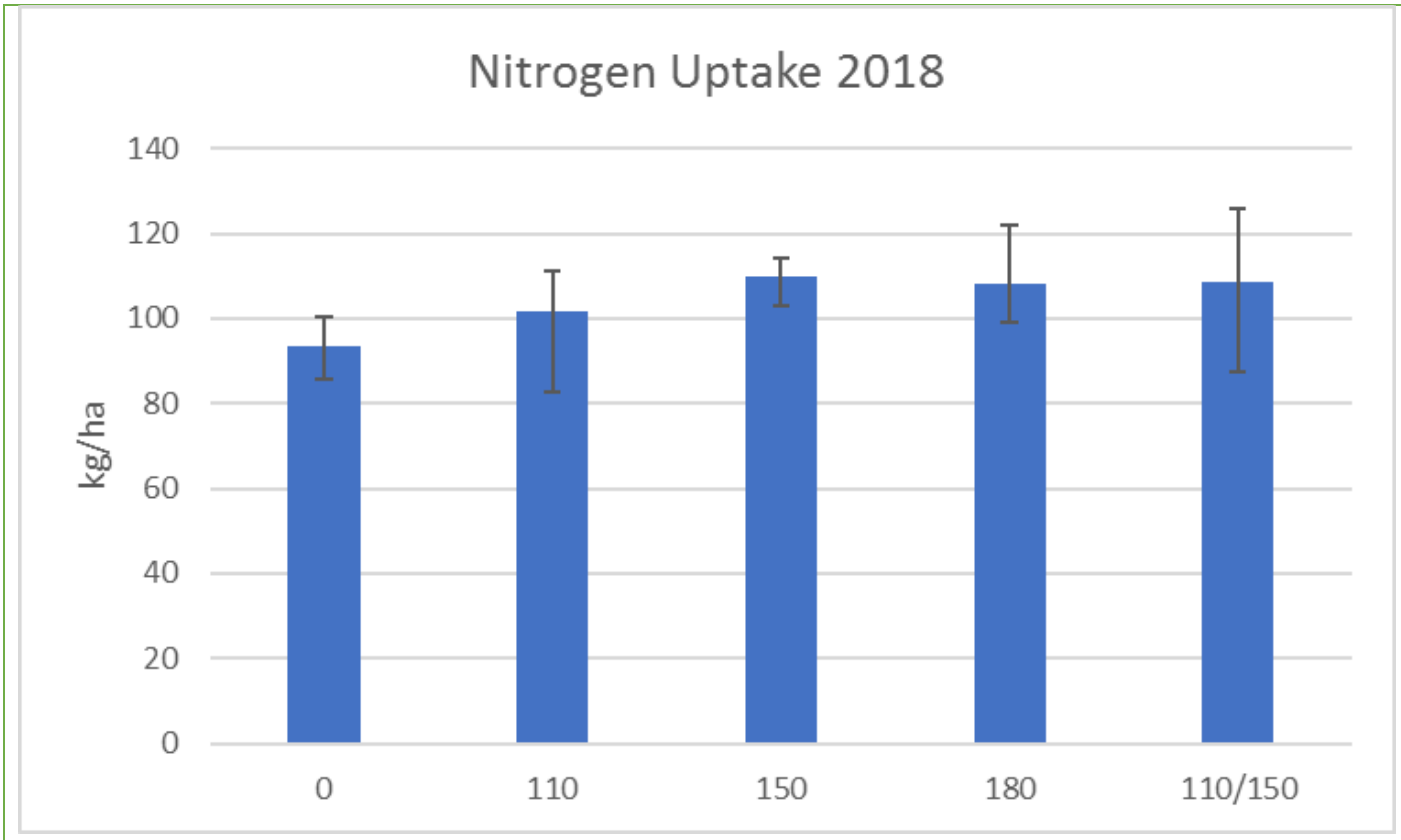

Figure 7 - Nitrogen uptake of plants at harvest

Conclusions and comments

At this stage of the trial there is no evidence to suggest that applying nitrogen at 110 kgN/ha for two consecutive years will run down the soil profile and reduce yields, however as this trial has only been harvested twice, it is too early to tell if this will change over time. Applying 180kgN/ha has not resulted in any extra cane or sugar yield indicating that the lower nitrogen rates provide a sufficient amount of nitrogen.

Advantages of this Practice Change:
Reduced nitrogen application lowering cost and reducing risk of runoff

Disadvantages of this Practice Change:
Risk of under application and 'mining' soil nitrogen stores

Will you be using this practice in the future:

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

Site is continuing 2019