

Project Catalyst

Case study



David Ellwood evaluates nutrient reduction

Grower Name: David Ellwood
Entity Name: DT Farming
Mill Area: Mackay Sugar
Total Farm Area: 155ha
Area under Cane: 135ha
No. Years Farming: 40
Trial Subdistrict: Victoria Plains



David Ellwood

THE CHALLENGE

The last several years has seen the extension of harvest seasons so crops are required to ratoon closer to start of wet season. The shorter the period from harvest to wet season will impact negatively on crop potential. Nutrients applied to late harvest can be within Six Easy Steps™ recommendations, but still be over supplying crop requirements due to low crop potential. The amount to reduce nutrients is never easy to answer, as many factors can influence crop performance. A trial was established to determine the effects of varied nutrient application for late harvest cane.

THE TRIAL

The trial commenced in November 2016 on 2nd ratoon, Q208 variety cane. All herbicide and irrigation actions were applied equally to all treatments, and in line with the growers standard practice. The only variable was the nutrient applications, with 3 nutrient application rates with the focus on nitrogen being 110, 130 and 150 kg N/ha (Table 1), the 150 kg N/ha is Six Easy Steps™ recommendation. The trial was conducted for 3 harvest seasons 2017-2019.

TRIAL DETAILS

Trial Crop: Sugarcane
Cane Variety: Q208, 2nd ratoon (2017 harvest)
Trial Farm: 3181A

Trial Block: 2-1 (4.3 ha)
Trial Design: Replicated random strip trial (3 treatments, with 3 replicates per treatment)
Soil Type: Nabilla; Dermosol (Aus Soil Classification).

TRIAL STAGES

	Date	Activities
Stage 1	Nov 2016	Crop harvested
Stage 2	Dec 2016	Apply nutrients as per trial design
Stage 3	October 2017	Harvest trial
Stage 4	Nov 2017	Apply nutrients as per trial design
Stage 5	Oct 2018	Harvest trial
Stage 6	Nov 2018	Apply nutrients as per trial design
Stage 7	Nov 2019	Harvest Trial – trial completed

What it's about

Project Catalyst is a grower-led innovation project in sugar cane that was formed to explore and validate farm management practice change leading to improved water quality for the Great Barrier Reef. For more information on Project Catalyst please visit our website <https://www.projectcatalyst.net.au/> or phone Catchment Solutions on 07 4968 4216.

RESULTS

To determine if lower nutrients for late cut ratoons would still yield the same as standard application the three rates applied were Six Easy Steps™ rate of 150 kg N/ha, Six Easy Steps™ minus 20 kg N/ha and Six Easy Steps™ minus 40 kg N/ha.

The trial was harvested under good conditions for all three years and was irrigated with 2-3 applications each year of 50-60 mm per irrigation. The data used for calculations was mill cane tonnes per treatment with CCS value calculated by SRA juice laboratory.

The nutrients were applied as liquid Dunder on the surface and incorporated by irrigation.

The yield variation between treatments was minimal (Figure 2, 3 & 4) and there was no significant difference between yield or CCS for treatments or years. The higher rate of 150 kg N/ha did yield slightly better across all years (Figure 5).

Sugarcane biomass analysis was conducted for the 2018 crop and nitrogen use efficiency calculated with treatment 130 kg N/ha achieving the highest NUE of 0.88 t/kg N (Figure 6).

The economic weighted comparison (Figure 7) shows very small variation between treatments, however the 2019 season was more favourable, and all treatments show improved performance.

CONCLUSION

The data for all three years consistently demonstrated that variation between treatments was minimal and there was no significant difference between treatments for all years (Figure 2, 5). The seasonal variation was more pronounced with CCS much lower in 2018 (Figure 3) and overall yield higher in 2019 (Figure 2).

The treatment 130 kg N/ha was the lowest or equal lowest performer for all years, however in wetter years one of the 130 kg N/ha would have a spring appear, potentially reducing yield.

In 2018 Nitrogen Use Efficiency (NUE) calculations show no clear trend (Figure 6), other than 130 kg N/ha had the two highest NUE of 0.84 & 0.88 t/kg. The average NUE for each treatment was 0.77 t/kg, 0.83 t/kg & 0.78 t/kg for 150 kg N/ha, 130 kg N/ha & 110 kg N/ha respectively.

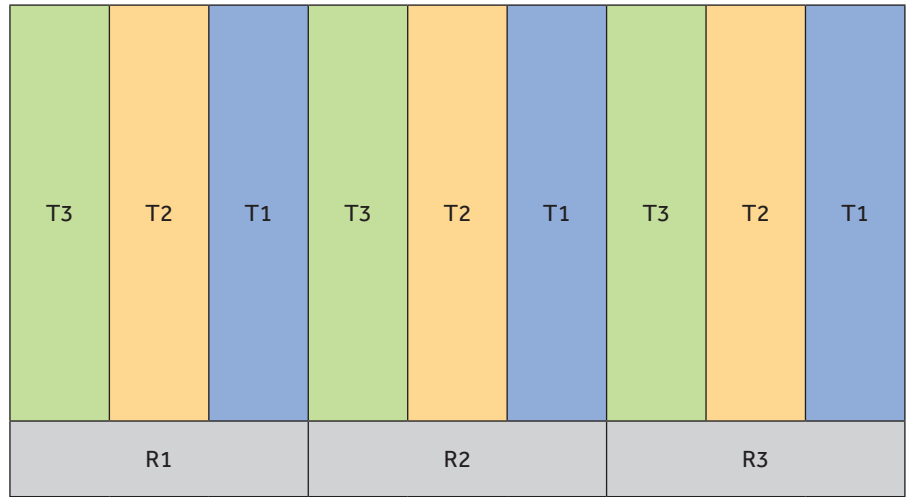


Figure 1 - Late harvest reduced nutrients trial plan

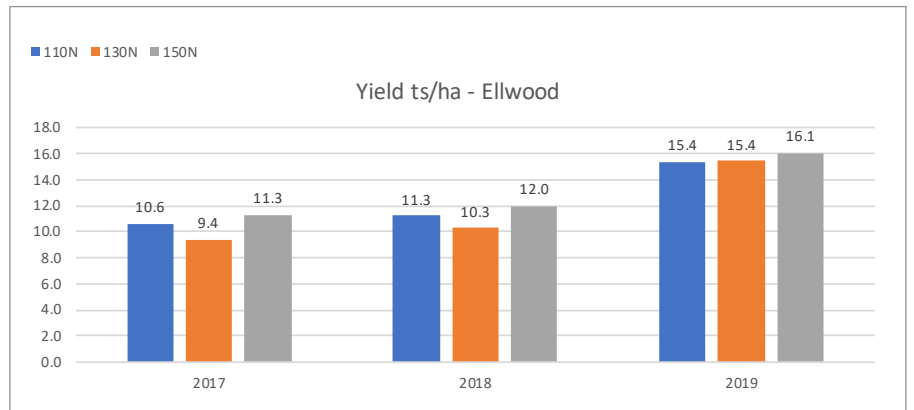


Figure 2 - Yield tonnes sugar for trial

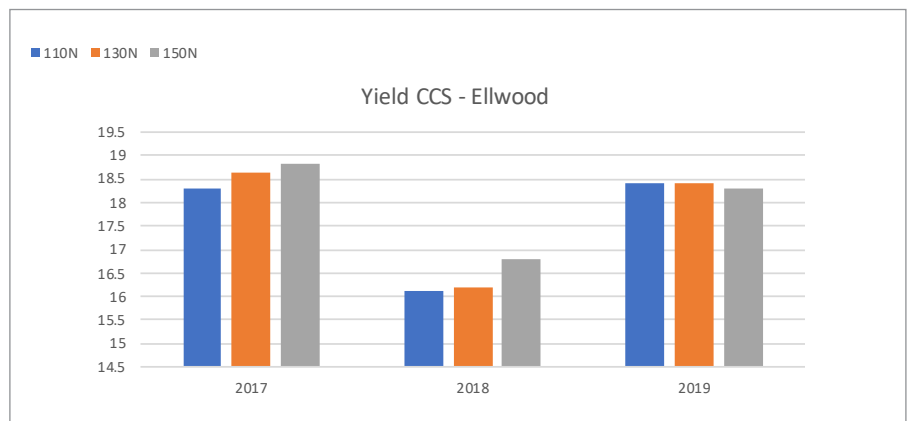


Figure 3 - Yield CCS for trial

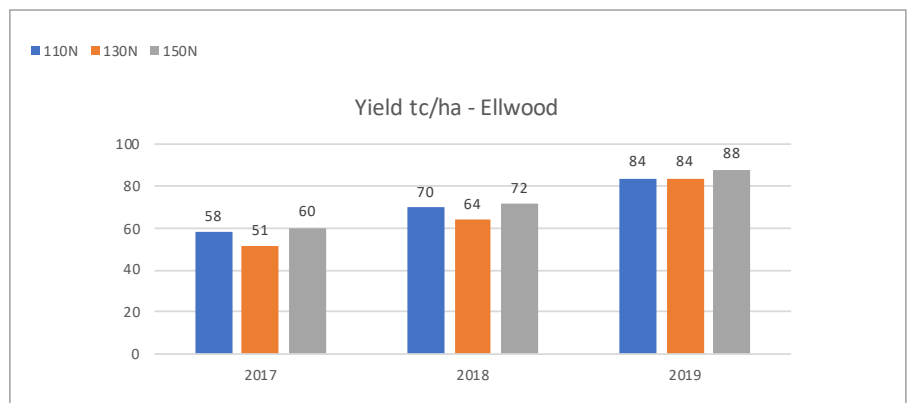


Figure 4 - Yield tonne cane for trial

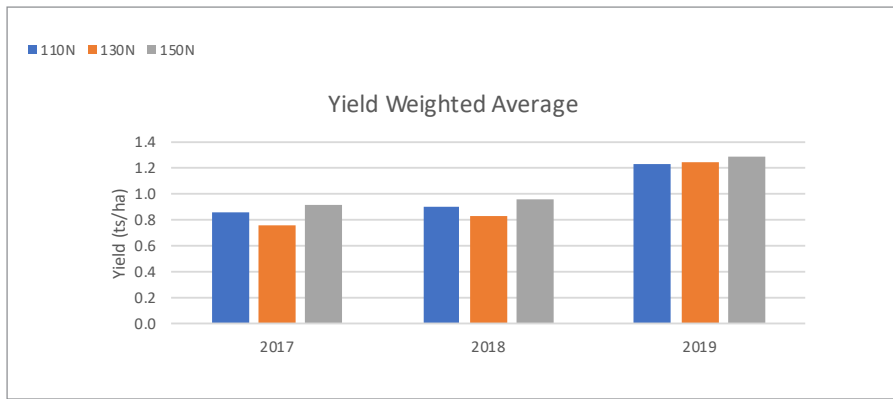


Figure 5 - Yield tonne sugar weighted average for trial

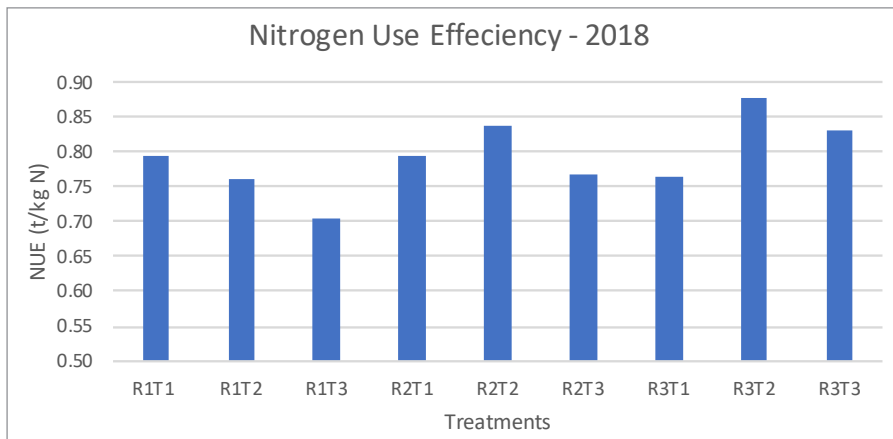


Figure 6 - Sugarcane NUE for 2018

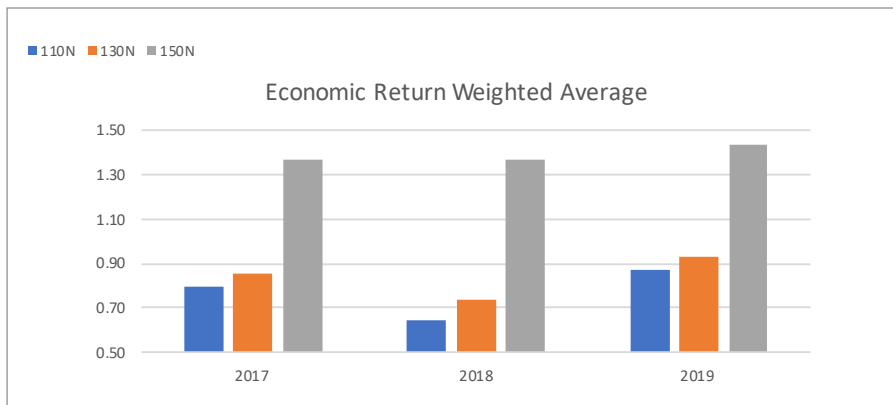


Figure 7 - Weighted economic return for trial

The economic analysis is a relative indicator of returns per treatment (Figure 7) and clearly shows only small variation between treatments for a given year and the season is the dominant influence for economic return.

The three years of data for the trial did not clearly demonstrate one nutrient range performed significantly better than any another, however the 150 kg N/ha consistently yielded slightly better (Figure 2). This trial demonstrates nutrient reduction in late cut ratoons did not significantly affect expected yield. However, for the same nutrient application trial had variation between years as high as 26 t/ha.

The grower has adjusted his nutrient program to align closer to the 120-130 kg N/ha and 90-110 kg K/ha in response to trial data and his observation of crop.

<p>T1 MKY 140P @ 3.0m³/ha 105 N, 9 P, 87 K, 18.5</p>
<p>T2 MKY 140P @ 3.7m³/ha 130 N, 11 P, 107 K, 22.5</p>
<p>T3 MKY 140P @ 4.3m³/ha 151 N, 12 P, 124 K, 26.5</p>

Table 1 - Nutrient treatment rates and product details