

Project Catalyst

Groundwater Nitrates Economics: 2019-20 Case Study Burdekin growers: Paula and Bryan Langdon

Growers participating in Project Catalyst trials worked with economists from the Department of Agriculture and Fisheries to identify costs and benefits of the trials. In this study, Paula and Bryan Langdon together with Farmacist trialled the application of reduced Nitrogen (N) rates to account for nitrates in irrigation water.

The objective of the trial was to determine the impact on production through varying the N rate in late ratoons to account for the additional nitrates supplied by irrigation water on the Langdon's farm. Yields and profitability were measured to compare the performance of different nitrogen (N) rates. The analysis presents third and fourth ratoon yields, CCS, variable costs, and gross margins.

Trial design

Farmacist conducted the trial with Paula and Bryan on their farm located in the Burdekin region. The randomised strip trial was established in 2018 on a third ratoon crop of KQ228 harvested in 2019. The trial was repeated on the fourth ratoon harvested in 2020.

The Langdon's standard N application rate for later ratoons irrigated with high nitrate bores is 185kg N/ha. The trial compared three different N rate treatments to determine the impact of reducing N rates to account for the groundwater nitrates contribution. These were 185kg, 155kg and 125kg of N/ha with each treatment having four replicates.

Key findings

- There was no significant difference in sugarcane yield, CCS or gross margin between varied N rates for the two ratoons included in the study.
- Further investigations into the ground water nitrate contributions to overall N uptake would be beneficial.

Agronomics

Trial results (Figure 1) show no statistically significant difference in yield across the three treatments ($p > 0.05$). There was also no significant difference in CCS (Figure 2) or sugar (t/ha) between treatments.

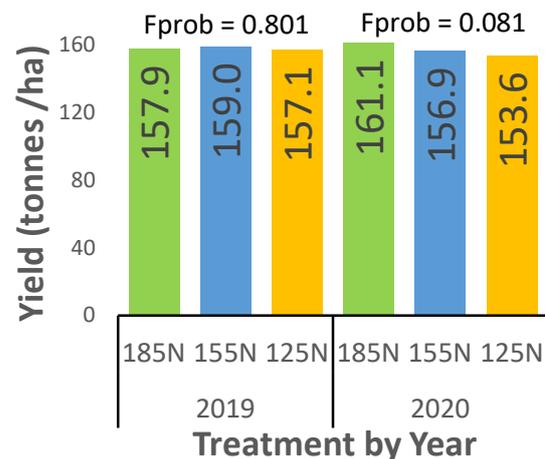


Figure 1: Average cane yields (t/ha, 2019-2020)

The groundwater used for irrigation on the Langdon's farm contains nitrates which should allow them to lower their amount of applied N particularly in the later ratoons. However, the

amount of available N supplied by the groundwater has not been measured to accurately ascertain N requirements.

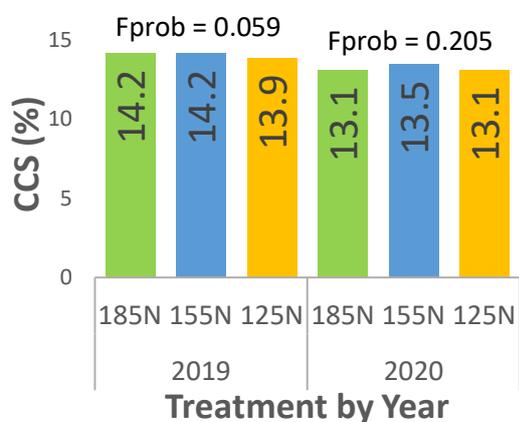


Figure 2: Average CCS (2019-2020)

Costs

Figure 3 presents the variable costs for the third ratoon. Differences in costs were due to the varied fertiliser rates and costs that changed with yield, namely harvesting costs and levies.

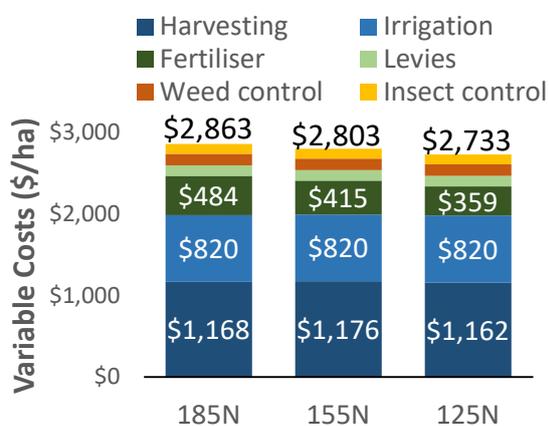


Figure 3: Third ratoon treatment variable costs (2019)

Figure 4 presents the total variable costs per treatment for the fourth ratoon.

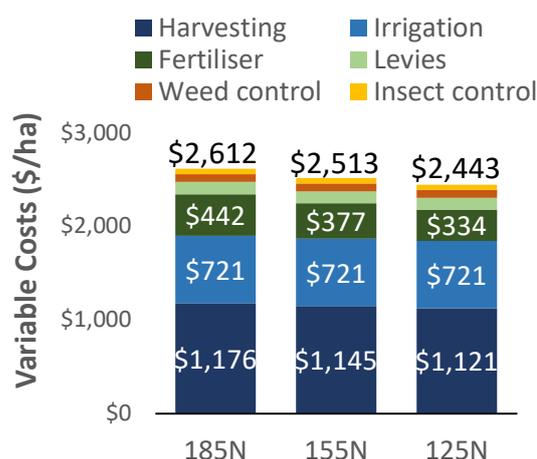


Figure 4: Fourth ratoon treatment variable costs (2020)

Gross margins

The gross margins (revenue less variable costs) for each treatment from the third and fourth ratoons, and the average total gross margin for the two years are presented in Table 1. These are based on a 5-year average sugar price (\$417/t).

For both the third and fourth ratoons, the 155 kg N/ha treatment had the highest gross margin, although this difference was not statistically significant.

Table 1: Gross margins (\$/ha)

Crop	Treatment			p-value
	185N	155N	125N	
3 rd Ratoon (2019)	\$3,315	\$3,400	\$3,214	0.261
4 th Ratoon (2020)	\$3,005	\$3,201	\$2,913	0.187
Average	\$3,160	\$3,300	\$3,064	0.138

Conclusion

With no significant differences in the mean yield, CCS or gross margin between treatments over the two years ($p>0.05$), the results suggest it may be worthwhile to further investigate the contribution of groundwater nitrates to crop N uptake.

A better understanding of the amount and availability of nitrates in the irrigation water may enable optimisation of applied N in late ratoons. This could potentially improve the profitability of the Langdon's farm through savings in fertiliser costs.

Note: the trial results are specific to this grower, paddock and prevailing conditions.

We acknowledge the contribution made by Farmacist in collection of trial data used in this publication, and Angela Anderson (DAF) for the statistical analysis and guidance.

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Publication date: February 2021



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