Subsurface Mill Mud Economics: 2018-20 Case Study

Mossman grower: Chris McClelland

Growers participating in Project Catalyst trials worked with economists from the Department of Agriculture and Fisheries (DAF) to identify costs and benefits of the trials. In this study, Chris McClelland and Mossman Agricultural Services (MAS) trialled subsurface mill mud application and reduced N rates on his farm.

The objective of the trial was to determine the impact of applying mill mud subsurface and reduced N, on both sugar yield and the resultant economics. Variable costs and mill data were used to undertake an economic analysis and compare profitability between the treatments over three crop classes. Trial results were analysed from the plant cane, first and second ratoons.

Trial design

The replicated strip trial was established in 2017 and was harvested in 2018 (plant), 2019 (1st ratoon) and 2020 (2nd ratoon). The trial compared four treatments as shown in Table 1.

Table 1: Treatment N application rates

Treatment	Description
T1	Full fert (Six-Easy-Steps N Rate)
T2	75% Full fert
T3	Full fert + Subsurface mill mud
T4	75% Full fert + Subsurface mill mud

Each treatment included three replicates applied in the same order across rows (non-randomised). Mill mud was applied subsurface at 54t/ha to two of the treatments (T3 and T4) before planting.

Key findings

- Average yields were higher for both mud treatments when compared to the others, although differences could not be validated statistically.
- Although inconclusive due to non-randomised replicates, the sub-surface mill mud and reduced N rate treatment (T4) had the highest total gross margin for the plant to 2nd ratoon crops.

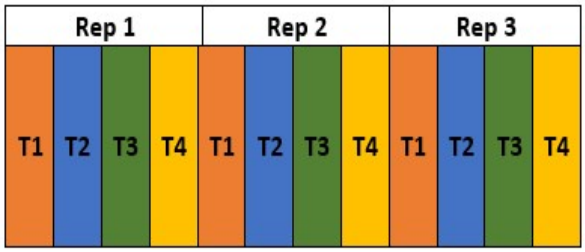

Figure 1: Trial Layout *(source: MAS)*

Agronomics

Average yields (for all treatments) were highest in plant cane when compared to the first and second ratoons. Figure 2 presents 2018, 2019, and 2020 cane yield data. In every year, yields were also generally higher for the mud treatments, but this could not be confirmed in the absence of a statistical analysis where replicates were non-randomised.

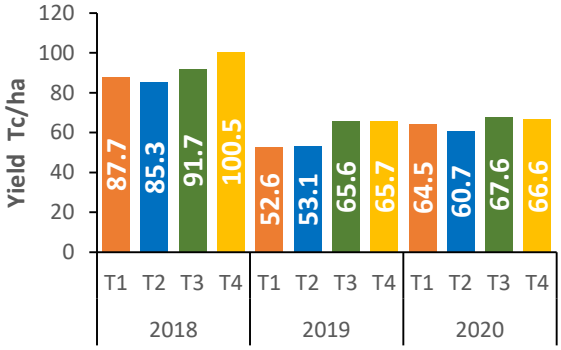

Figure 2: Sugarcane yield results (t/ha)

Figure 3 presents average sugarcane yield over three years from the four treatments. Treatments containing mud show a higher average yield from the plant cane. However, this could not be confirmed in the absence of a statistical analysis.

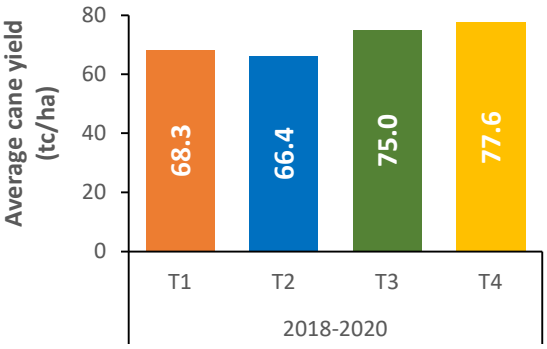

Figure 3: Combined average sugarcane yield results for each treatment 2018-20 (t/ha)

Figures 4 and 5 present the average CCS and sugar results for each treatment from the plant cane harvested in 2018, to the second ratoon harvested in 2020.

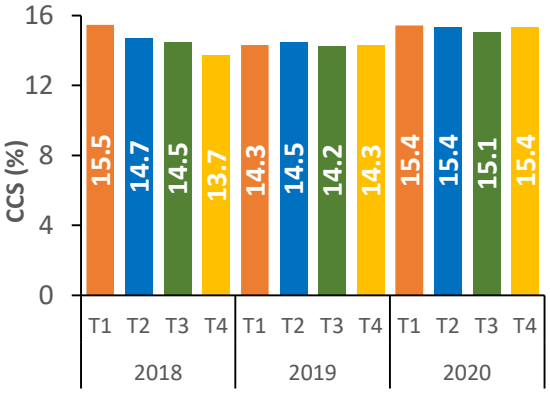

Figure 4: Average mill CCS results (%)

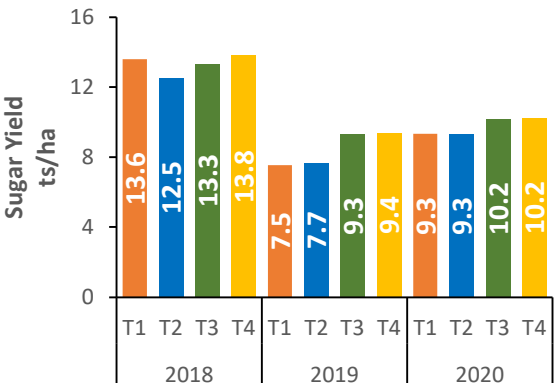

Figure 5: Sugar yield (ts/ha)

In the plant crop, CCS was marginally lower in each year for the mud treatments. However, differences in CCS or sugar could also not confidently be attributed to the treatment effect in the absence of statistical data.

Costs

The combined average annual variable costs for 2018, 2019 and 2020 seasons are presented in Figure 6. The difference in treatment variable costs were largely due to the initial mill mud and application cost differences in the fallow ($446/ha added cost of mud), annual differences in fertiliser costs (based on treatment differences), and harvesting costs and levies, which were proportional to yield. All other operational and treatment costs were the same.

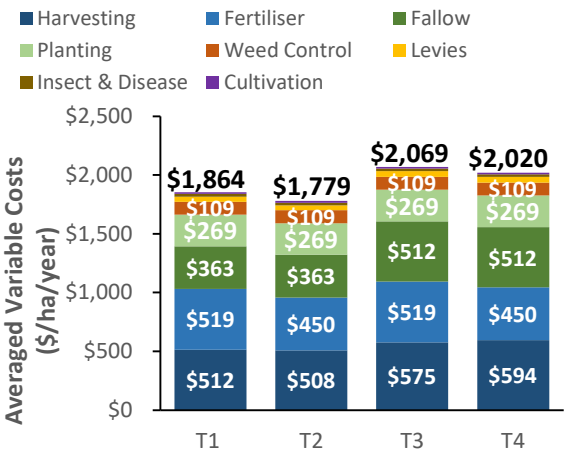

Figure 6: 2018-20 Average annual variable costs per treatment, fallow to 2nd ratoon ($/ha)

Gross Margins

Gross margin results (revenue less variable costs) are presented in Table 2 for the fallow, plant cane, first and second ratoons, including the average for each treatment. Treatment 4 had the highest average gross margin with the lowest from Treatments 2 & 3. However, no statistical analysis could be performed and therefore the observed differences could not confidently be attributed to the treatments.

Table 2: Gross margins ($/ha)

Crop Class	Treatment			
	T1	T2	T3	T4
Fallow	-$1,089	-$1,089	-$1,535	-$1,535
Plant cane	$1,449	$1,194	$1,251	$1,338
1st Ratoon	$1,073	$1,236	$1,452	$1,589
2nd Ratoon	$1,728	$1,577	$1,750	$1,785
Average	**$790**	**$730**	**$730**	**$794**

Conclusion

Chris wanted to determine if the added benefits of nutrients from mill mud and the extra cost of subsurface application would outweigh the option of not applying mill mud.

Average sugarcane yields for the plant, first and second ratoons were higher for the mud treatments. While there was no clear difference in CCS between treatments, the application of mud resulted in higher sugar yields. Despite the additional cost of mud application in fallow, the average gross margin over the trial period was quite similar with no consistent difference between mud and no mud treatments. Gross margins were generally higher for the mud treatments in the plant cane, first and second ratoon. Incorporation of follow-up ratoons (third and fourth) could provide further insight into the economic benefits of mud, in particular if the trend of increased sugar yields continues in later ratoons.

The economics on applying mill mud in sugar cane was analysed in the trial. Observed differences could not confidently be attributed to treatment effects due to the non-randomised trial design. Future research work should utilise a randomised trial design to help validate the economic implications of mill mud.

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

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

For more information on the economic analysis, please contact DAF:
Tich Pfumayaramba - Ph: (07) 3330 4507
Email: Tichaona.Pfumayaramba@daf.qld.gov.au

For more information on the agronomic results, please contact Mossman Ag Services (MAS):
Rebecca McHardie – Ph: 0457 020 839
Email: rebecca@mossag.com.au

Publication date: June 2021

Project Catalyst is funded by the partnership between the Australian Government's Reef Trust and the Great Barrier Reef Foundation, and the Coca-Cola Foundation with support from WWF-Australia and Catchment Solutions Pty Ltd.