

Project Catalyst

DunderUnder Economics: 2019 Case Study

Mackay growers: Sam, Gerry & Joe Deguara

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, the Deguaras' and Farmacist trialled surface and subsurface application methods of BioDunder (Dunder) fertiliser.

The objective of the trial was to determine the water quality and economic impact of both subsurface and traditional surface application methods of Dunder. Through cost effective methods of applying Dunder subsurface, it was expected that both water quality outcomes¹ and yields would improve, while having little impact on the overall profitability of the system.

Trial design

Farmacist assisted the Deguara family on their Eton farm in conducting the trial over the 2018 and 2019 period. This trial was a repeat trial for the Deguaras following their DunderUnder trial run between 2016 and 2018 on a separate block. The Deguaras applied Dunder on 2nd ratoon cane (Q240) in 2018 that was harvested in 2019. The trial was a randomised strip trial and included three replications for both treatments. Using both a traditional (surface) and subsurface method, the Deguaras applied 3.9 m³/ha of MKY Econo LOS (Liquid One-Shot) to both treatments. A modified applicator was used to apply subsurface.

Key findings

- Subsurface application of BioDunder resulted in an unexpected lower yield and reduced gross margin, although this was not statistically significant.
- Further investigation is necessary since previous trials have shown that subsurface application of BioDunder resulted in yield improvements.



Figure 1: Sam and Gerry Deguara alongside their modified subsurface Dunder applicator

Agronomics

Yields were 3.8 t/ha lower from the subsurface treatment. This was unexpected given the subsurface application method was expected to reduce both runoff and volatilisation losses of nitrogen, previously evident from results of the Deguara 2017-18 DunderUnder trial. Although CCS was marginally lower (0.17%) for the subsurface treatment, this was not statistically significant.

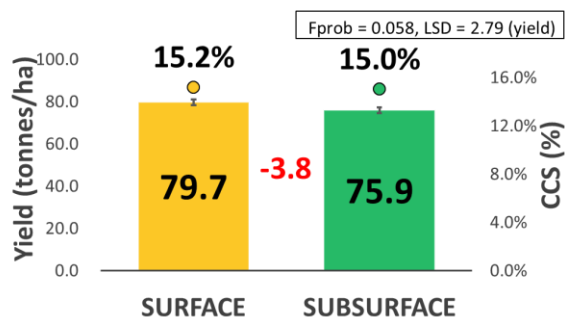


Figure 2: Treatment yields (tonnes/ha)
 Source: Farmacist
 Error bars indicate 95% least significant difference (overlapping indicate no significant difference)

Costs

The Deguaras' estimated the replacement value of the subsurface applicator at \$100,000. Due to a lower tank capacity, this was approximately \$50,000 less than the surface applicator. Although this translated to marginally lower capital costs per hectare (\$6/ha) depreciated over 20 years, the variable machinery costs were \$27 per hectare higher due to the longer machinery cycle times. The subsurface applicator averaged a far lower 3 ha per hour work rate against 7 ha per hour for the surface applicator. This was the result of more tank fills, slower speed to apply subsurface, and less cane row pass coverage (three rows instead of seven).

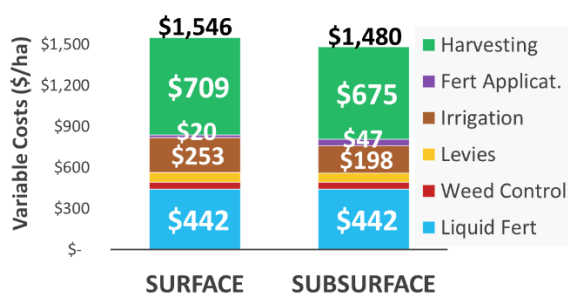


Figure 3: Treatment variable costs

Despite the higher cost of using a modified applicator for the Dunder, the economic analysis identified savings in irrigation costs. Subsurface application of Dunder did not require the usual 'watering in' (25mm applied), which amounted to an irrigation cost saving of \$55 per hectare in the trial (given this would be the common practice on a commercial scale the cost difference is considered, however, in the

trial both treatments still received the additional irrigation water due to the trial layout). Figure 3 shows the average variable cost of the subsurface treatment to be \$66 per hectare lower which included the effect of lower yields on both harvesting costs and levies.

Gross margins

The economic results showed a \$147/ha reduced gross margin (revenue less variable costs) for the subsurface treatment (figure 4) based on a 5-year average sugar price. Despite lower variable costs, these were outweighed by the reduced sugar yield in the subsurface treatment (0.7 ts/ha lower).

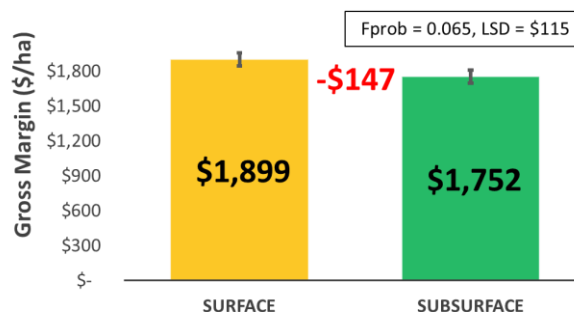


Figure 4: Average gross margins
 Error bars indicate 95% least significant difference (overlapping indicate no significant difference)

Conclusion

In comparison to the previous trial's results where gross margins were similar, the 2019 harvest results showed a loss in yield through the application of Dunder subsurface. Further ratoon results will be monitored as this outcome contrasted previous trials.

It may also be necessary to analyse commercial implement capital cost differences over a shorter planning horizon as the trial showed negligible differences where in-house modifications had been made.

"Previous trials, comparing similar application methods showed very little difference in yield. These were measured over a number of years so initial results of this trial are surprising." – Natalie Fiocco (Farmacist).

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

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ⁱ The Deguara's previous DunderUnder trial showed a 50% decrease in dissolved inorganic nitrogen and 11% decrease in nitrogen run-off (Catchment Solutions, 2018).



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