Department of Agriculture and Fisheries

# Project Catalyst

## Subsurface Mud/Ash Economics: 2018-20 Case Study

## Mackay (Eton) grower: Phil Deguara

**Key findings**

- There were different yield responses between the Mud and Ash plots.
- A full crop cycle is required to determine overall effects on sugar yield and profitability where initial high ameliorant costs overestimate the economic advantages of the Ash plot control.

*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, grower Phil Deguara and Farmacist examined surface and subsurface application methods of Mill Mud (mud) and Ash on two demonstration plots.*

The objective of the demonstrations was to examine both the agronomic and economic impact of applying mud and ash subsurface against the standard surface application method. Through cost effective means of applying ash and mud subsurface, it was expected that both water quality outcomes and yields would improve, while having little impact on the overall economics of the system. The analysis presents yield, CCS, sugar, variable costs, and gross margins for the preceding soybean crop (2018), plant cane (2019) and first ratoon (2020).


***Figure 1: Phil Deguara on his farm in Eton (Mackay)***

### Trial Design

Two non-randomised plots were established by Farmacist and Phil Deguara on his Eton family farm in 2017. In the first demonstration plot (Mud plot), 50 t/ha of a mud/ash mix was applied with both surface and subsurface methods before planting soybeans (two treatments). The third treatment (control) received no mud.

The second plot (Ash plot) had the same 50 t/ha mill mud/ash mix applied across all treatments (surface, subsurface and control). An additional 100t/ha of ash was then applied to the surface and subsurface treatments. In this case the third treatment (control) received no ash. Table 1 outlines the mud and ash application rates per treatment.

Surface treatments of mud/ash and ash were applied in a band. The subsurface method involved applying the band into a slot for covering later with a mounder. Both demonstrations were conducted under similar conditions on neighbouring paddocks and planted to the variety SP80.

***Table 1: Ameliorant application rates (tonnes/ha)***

| Ameliorant | Application Rate (t/ha) | | |
|---|---|---|---|
| | Control | Surface | Subsurface |
| **Mud Plot** | | | |
| Mud / Ash | 0 | 50 | 50 |
| Ash | 0 | 0 | 0 |
| **Ash Plot** | | | |
| Mud / Ash | 50 | 50 | 50 |
| Ash | 0 | 100 | 100 |

## Agronomics

Figures 2 and 3 present plant cane, ratoon and average yields for the Mud and Ash plots respectively. The Mud plot showed consistently higher yields for the surface applied treatment, while the Ash plot showed little difference between application methods with yield rankings reversing between plant and first ratoon.

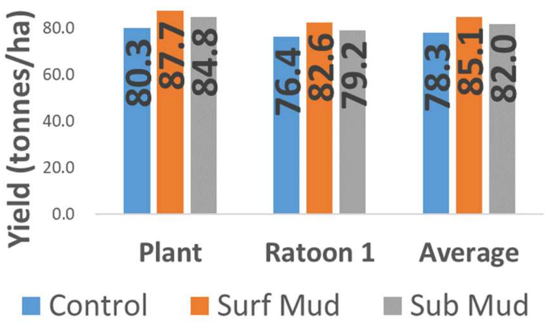


***Figure 2: Cane yields (t/ha) - Mud plot***

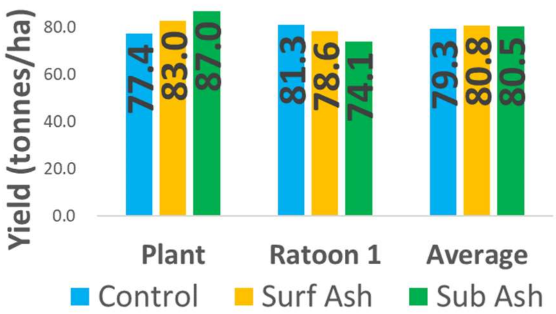


***Figure 3: Cane yields (t/ha) - Ash plot***

For both plots average CCS was slightly higher for the subsurface treatments with the surface applied methods giving the lowest overall average CCS (see figures 4 and 5). The gain in CCS for the subsurface treatments was evident in the first ratoon for both plots.

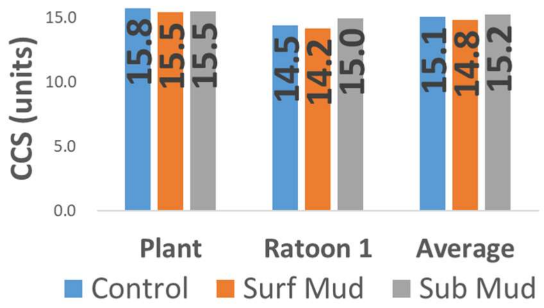


***Figure 4: CCS - Mud plot***

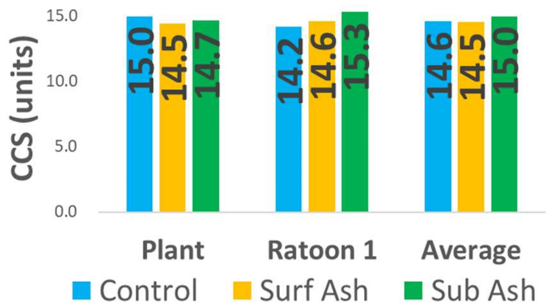


***Figure 5: CCS - Ash plot***

Average sugar yields (figure 6) from the Mud plot were higher in both mud/ash treatments when compared to the control. However, there was little difference in yield between application methods. For the Ash plot, the subsurface treatment showed a higher sugar yield when compared to both the surface and control treatments.

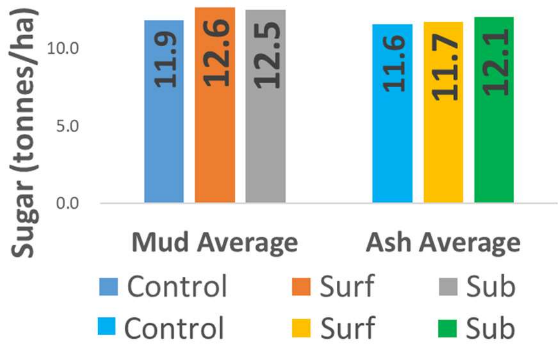


***Figure 6: Sugar (t/ha) – Mud & Ash plots***


*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.*

Yields and CCS will continue to be monitored for the full crop cycle to demonstrate longer-term effects on profitability.

## Costs

Differences in average variable costs were largely attributed to mud/ash and ash cost variations prior to planting of the soybeans (see figures 7 through to 10). This included $349/ha more for the mud/ash mix in both plots and an additional $330/ha for the ash application. To place the mud/ash subsurface, an additional $53/ha was required for the subsurface treatment in both plots (two passes with the mounder).

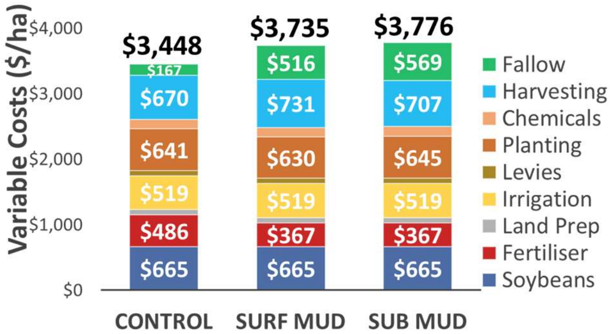


*Figure 7: Soybean/Plant variable costs – Mud plot*

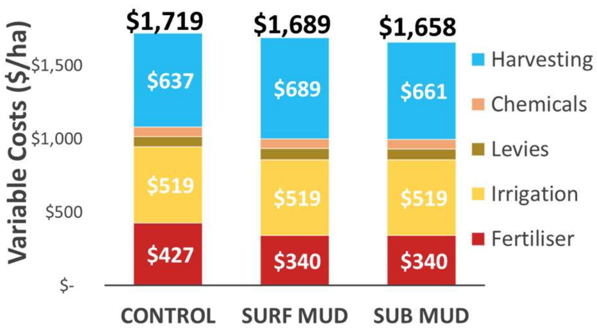


*Figure 8: 1st Ratoon variable costs – Mud plot*

Due to the mud plot control receiving no mud, costs for the application of ammonium polyphosphate (APP) are included in both the plant and ratoon crops (45l/ha applied to ensure the availability of phosphorous). Other cost differences were linked to changes in harvesting costs and levies due to variations in yield.

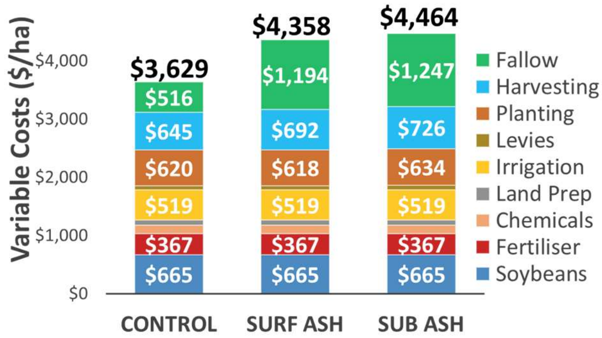


*Figure 9: Soybean/Plant variable costs – Ash plot*


*Figure 10: 1st Ratoon variable costs – Ash plot*

## Gross Margins

Total gross margin (revenue less variable costs) for the soybean, plant and ratoon crops in the mud plot was $27/ha higher for the surface compared to the subsurface treatment. The control resulted in the lowest gross margin.

For the ash plot the control had the highest average gross margin. This was due to the high initial costs of applying both mud and ash in the other treatments. However, where ash was applied, the subsurface treatment had a $182/ha higher gross margin compared to the surface application.

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*Table 1: Gross margins ($/ha), Mud & Ash plots*

| Product/Crop | Treatment | | |
|---|---|---|---|
| | Control | Surface | Subsurface |
| **Mud Plot** | | | |
| Fallow/Soybeans | $1,058 | $710 | $657 |
| Plant Cane | $1,026 | $1,319 | $1,212 |
| 1st Ratoon | $1,364 | $1,569 | $1,702 |
| **Total** | **$3,449** | **$3,598** | **$3,571** |
| **Ash Plot** | | | |
| Fallow/Soybeans | $710 | $31 | -$22 |
| Plant Cane | $832 | $854 | $1,030 |
| 1st Ratoon | $1,531 | $1,563 | $1,621 |
| **Total** | **$3,072** | **$2,448** | **$2,630** |

*Note: The case studies were not randomised or replicated and thus no statistical comparison was done. Any difference observed in gross margins can therefore not confidently be attributed to the treatment difference.*

## Conclusion

Although the results remain inconclusive in the initial plant crop and first ratoon, the anticipated future benefits of ameliorants in the follow-up ratoons are expected to improve the sugar yield at a reduced cost (e.g. lower phosphorous requirements when compared to the Mud plot control). However, the initial high cost of applying the additional ash (Ash plot) will require significant gains in the ratoons to offset the savings in the control. A full crop cycle analysis would therefore be important to validate the overall economic impact of the ash treatments against the control.

*"By including phosphorous in the initial ameliorant program, the nutritional program is also simplified for the remaining crop cycle. This is beneficial against currently complex nutrient program requirements."*
**John Turner.**

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

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