Banded mill ash – economic case study, Ingham region

Grower: Robert Bonassi

Robert is trialling using a contractor to apply banded mill ash on his 70 hectare farm in Bambaroo West. Various fertiliser rates are being compared, following an application of mill ash to the whole trial area. Robert hopes the mill ash will allow him to reduce his fertiliser rates while maintaining, or potentially increasing, production. Mill by-products such as mill mud and mill ash are commonly used in the sugarcane industry as low-cost soil conditioners and sources of nutrients. Banding of mill by-products (applying the product directly on the crop zone, leaving the traffic zone free) means that much of the nutrition and soil conditioning benefits can be retained while applying the product at a lower rate and cost per hectare.

Key findings

- Results indicate that an increase in average yield over the crop cycle of between 5.4 and 6.6 tonnes per hectare would be required to offset the cost of mill ash.
- If fertiliser rates were reduced in line with Six Easy Steps recommendations, the break-even yield increase is between 1.6 and 2.4 tonnes per hectare.
- The contract application cost had a significant impact on the profitability of applying mill ash.

Trial description

The trial is being conducted on a 3.39 hectare block, with 1.8m dual rows and controlled traffic. Banded mill ash was applied in fallow at a rate of 110 tonnes per hectare, and the trial treatments consist of two replications of three nutrient application rates – a standard rate of fertiliser (160 kg/N/ha), a half rate of fertiliser (80 kg/N/ha) and a custom fertiliser blend with a low N rate (50 kg/N/ha).

The mill ash was bulk-delivered to the farm at a rate of $5.50 per tonne, and was applied by a contractor using a GPS-enabled tractor and spreader, which was able to accurately control the rate of product applied to the trial block.

Cane was planted early September 2015, and Robert intends to continue the trial into 1st and 2nd ratoons.

Table 1 outlines the different treatments. A standard rate of fertiliser was applied at plant, and the different treatments were applied as a top dress prior to hilling up.

Table 1: Trial treatments

No.	Description	Product	N rate (kg/N/ha)	Product rate (kg/ha)
T1	Full rate	CK161	160	593
T2	Half rate	CK161	80	297
T3	Low N rate	Custom Blend	50	349

The product analyses of the two fertiliser products are shown in table 2. The product analysis of the custom blend was chosen to balance the rates of P, K and S with T1, while applying minimal N.

Table 2: Product analysis

Product	N	P	K	S
CK161	27.6	2.6	16.0	0.2
Custom Blend	14.6	4.4	27.4	0.4

Methodology

The following analysis examines the impact of applying mill ash in conjunction with the different trial fertiliser treatments on Robert's farm gross margin.[1] The Farm Economic Analysis Tool (FEAT) was used to estimate Robert's typical growing expenses such as fertiliser application costs, pesticides and other machinery operations.

The impact of each treatment on subsequent cane yield will not be known until the plant cane is harvested in 2016. This study will compare the costs of each treatment, and examine the yield increase required to make the treatments worthwhile from an economic perspective.

Other parameters used in the analysis include: a sugar price of $430 per tonne;[2] a labour price of $30 per hour; and a fuel price of $1 per litre (net of the diesel rebate and GST). Fertiliser and pesticide prices were sourced from local suppliers.

Results

A comparison of the fertiliser costs for each treatment is shown in table 3. The cost of T3 is higher than T2 as it has a higher rate of P, K and S.

Table 3: Fertiliser costs per hectare

Treatment	Amount ($/ha)
T1 (full rate)	$414
T2 (half rate)	$207
T3 (low N)	$260

The per hectare costs of the mill ash application is shown in table 4. Robert's farm is 32 km from Victoria Mill.

Table 4: Mill mud application costs

Description	Cost ($/ha)
Mill mud delivery	$605
Contract application cost	$488
Total	**$1,093**

Robert noted that using the contractor to apply the mill ash resulted in a significant increase in cost ("contract application cost" in table 4), however he was able to achieve a much greater accuracy in the rate of application compared to using the delivery truck to apply the ash. Robert also noted the application took longer in the trial than it would under normal circumstances, so a lower application cost may be possible in future.

Table 5 shows the plant cane gross margin analysis for each treatment. Apart from the different trial fertiliser costs, all other variables are the same for each treatment. Due to the absence of trial production data, yield and CCS are held constant across all treatments, based on Robert's typical production results. Variable costs consist of the trial costs and other growing costs, such as planting, harvesting, pesticide control and the fertiliser application at plant. Gross margin figures are derived by subtracting variable costs from revenue.

Table 5: Plant cane gross margin analysis

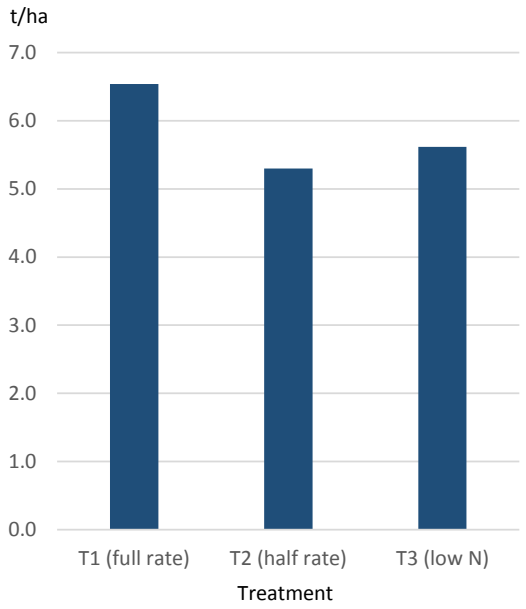
	Revenue ($/ha)	Variable costs ($/ha)	Gross margin ($/ha)
T1	$4,656	$2,476	$2,180
T2	$4,656	$2,269	$2,387
T3	$4,656	$2,322	$2,334

[1] Gross margin equals revenue minus variable costs, which include chemical, fertiliser, machinery and harvesting costs.

[2] $430 per tonne is the 5 year average (2010-14) of QSL's seasonal and harvest pools.

In order to be economically viable, the cost of the mill ash application would need to be offset by a reduction in fertiliser costs and/or an increase in yield in the following cane crops. Figure 5 shows the average yield increase over the crop cycle required to offset the cost of the mill ash application.

Figure 1: Average yield increase required to offset mill ash cost



An alternative analysis is to compare the cost of mill ash with the corresponding reductions in fertiliser recommended by the Six Easy Steps guidelines.

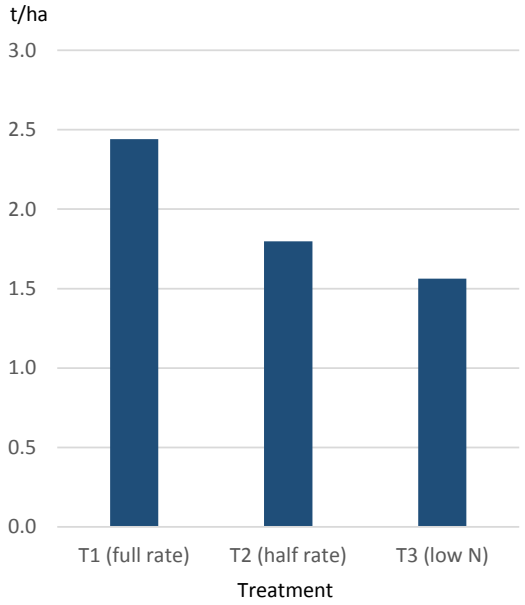
Following an application of mill ash, the Six Easy Steps guidelines recommend applying no additional phosphorus for a whole crop cycle, and reducing potassium application by 120 kg per hectare per year in plant and first ratoon. Table 6 shows the savings that would result from applying these reductions to the trial fertiliser rates in plant cane and Robert's typical fertiliser rates in ratoons.

Table 6: Fertiliser savings based on 6 Easy Steps

Crop class/treatment	Saving ($/ha)
Plant cane	
T1 (full rate)	200
T2 (half rate)	100
T3 (low N)	192
Ratoons	
1st ratoon	266
Later ratoons	73

As a result of these savings, the average yield increase required to offset the net cost of applying mill ash is now lower (figure 2).

Figure 2: Yield increase required to offset mill ash cost net of 6 Easy Steps fertiliser savings



Sensitivity analysis

As previously noted, the contract application cost of $488 per hectare represented a significant proportion of the total cost of applying mill ash in this trial. The following analysis examines the sensitivity of the break-even yield increase to changes in the cost of applying the mill ash. The analysis has been applied to T1 (the standard fertiliser

treatment), assuming the Six Easy Steps reductions to fertiliser rates have been made over the crop cycle. Figure 3 shows the average required yield increase required to offset the overall cost of mill ash, at a range of mill ash application costs.

Figure 3: Sensitivity of break-even yield to changes in mill ash application cost

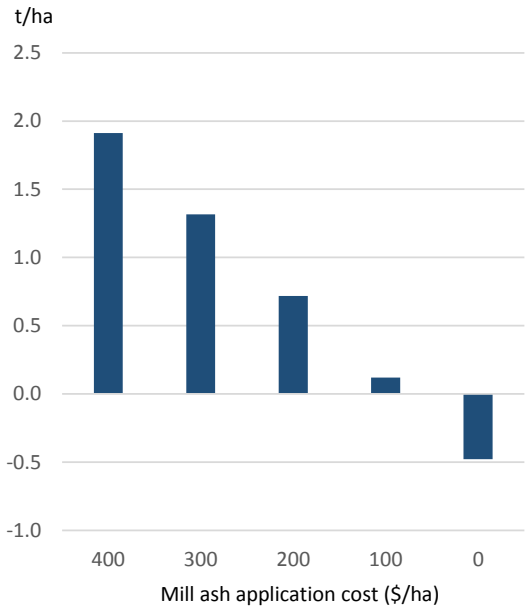


Figure 3 shows that the break-even yield increase is quite sensitive to the mill ash application cost. At an application cost of $400 per hectare, the average yield increase required to break even is 1.9 tonnes per hectare. If the application cost decreased to $200 per hectare, the break-even yield increase would be only 0.7 tonnes per hectare over the crop cycle.

Conclusion

This study examined the economic implications of applying mill ash followed by different rates of fertiliser on a sugarcane farm south of Ingham.

Results indicate that an increase in average yield between 5.4 and 6.6 tonnes per hectare would be required to offset the cost of mill ash at the rates of fertiliser applied in the trial. However, if fertiliser rates were reduced in line with Six Easy Steps recommendations, the break-even yield increase is between 1.6 and 2.4 tonnes per hectare.

Sensitivity analysis revealed that the contract application cost had a significant impact on the profitability of applying mill ash, with the break-even yield increase shown to be highly sensitive to changes in the contract application cost.

Production results from the 2016 harvest will provide a clearer indication of the impact that mill ash had in conjunction with the fertiliser rates trialled.

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