Mill by-products (mill mud & mill ash) for improved cane productivity in the Herbert

by
Lawrence Di Bella (HCPSL Manager)

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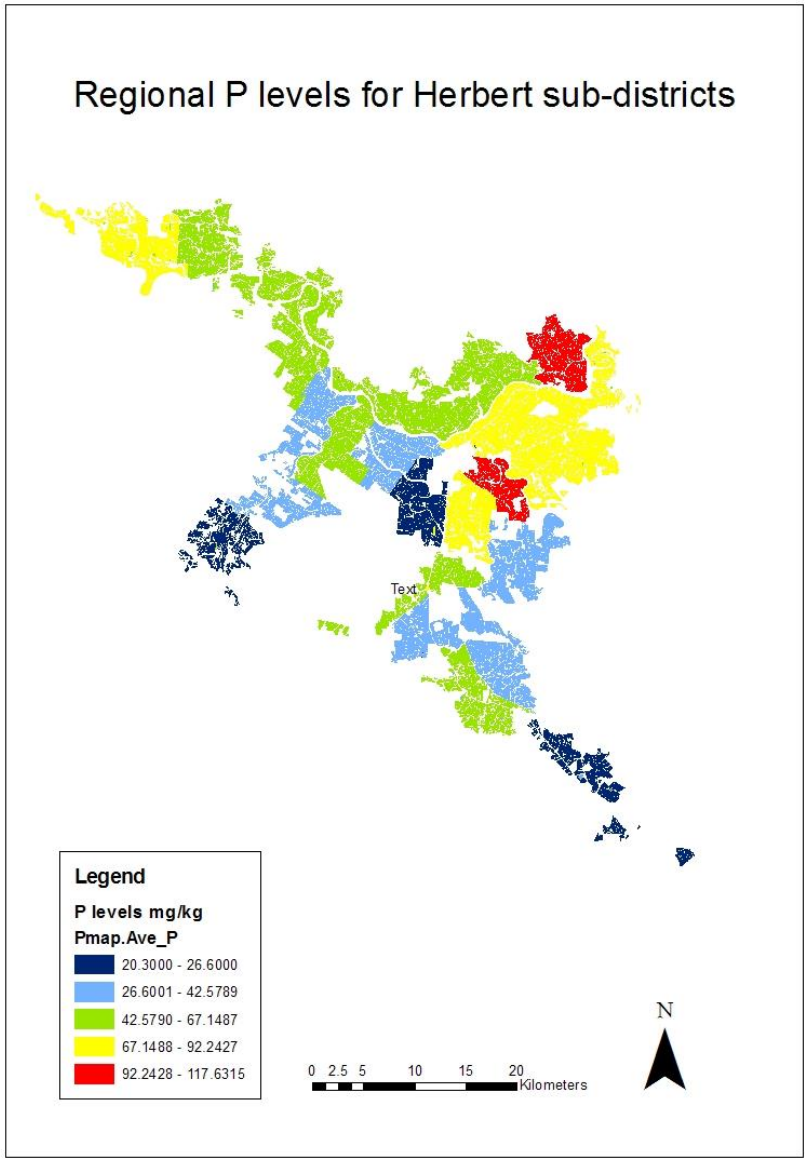
Issues specific to the Herbert

- Generally applications of mill by-products occur in close proximity to the sugar mills causing:
  - High levels of specific nutrients found in soil test results (Di Bella et.al, 2009)
  - High levels of P found water quality samples from the Macknade area
  - Environmental management concerns

- The soils that could benefit greatly are usually not treated.



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Reduced rates

Improved application equipment in the Herbert

- Mud trucks can apply around 100t/ha wet mill mud
- There now 7 tractor pulled applicators operating in the district applying rates <100 t/ha wet weight of mud, ash or mud/ash mixes. Single row application can be very slow going.

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Precision application

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Dualem mapping, with geo-referenced soil testing and precision mill mud/ash application- this is the next step.

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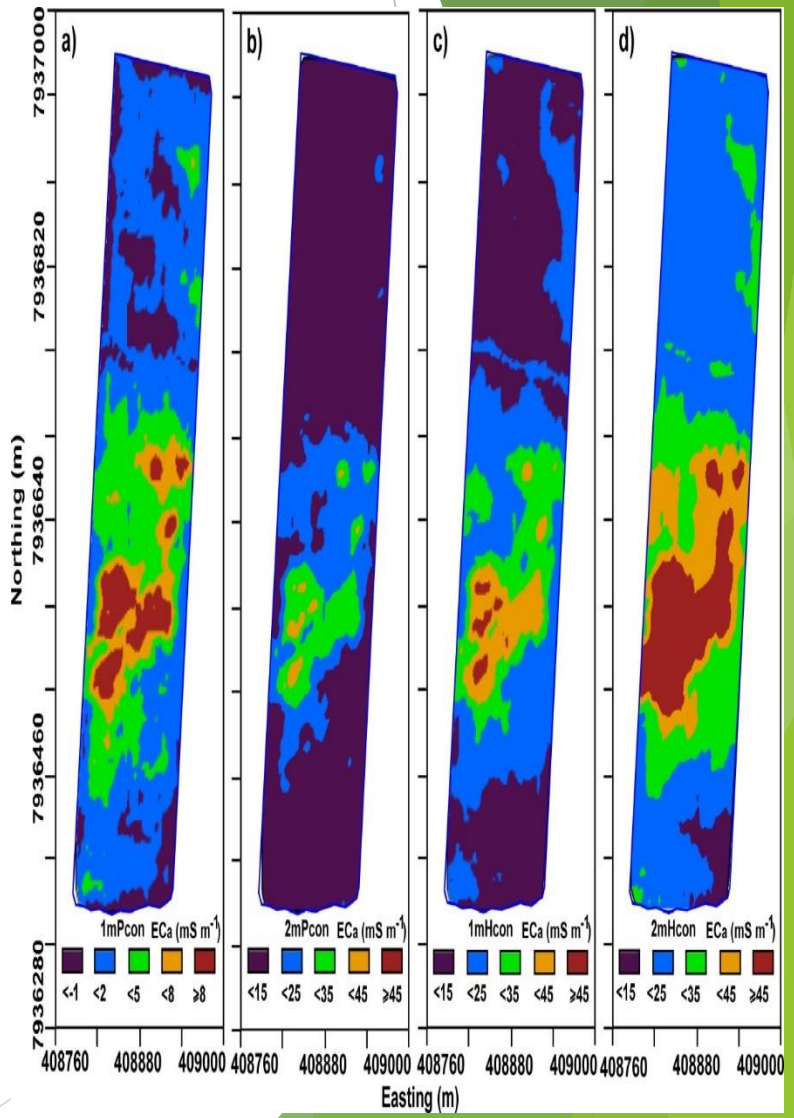
Nutrient inputs based on geospatial data, soil types and analysis

HCPSL has purchased a Dualem to allow for soil mapping in the Herbert.

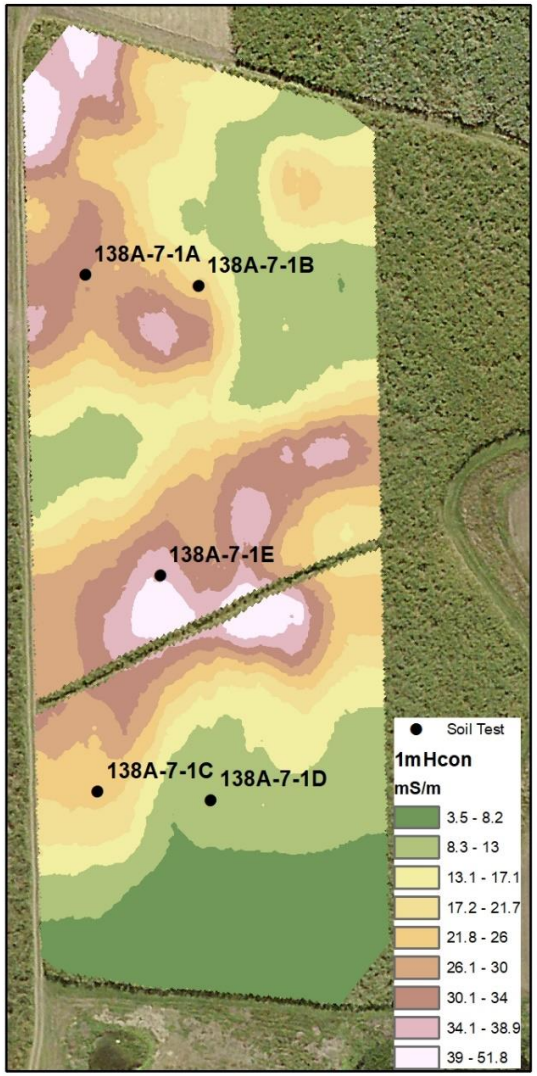
HCPSL has partnered with UNSW to develop the techniques required.



Lynn
BLOCK 0138A-07-01

Electromagnetic Condictivity

1mHcon EC measurements in millisiemens per metre (mS/m)

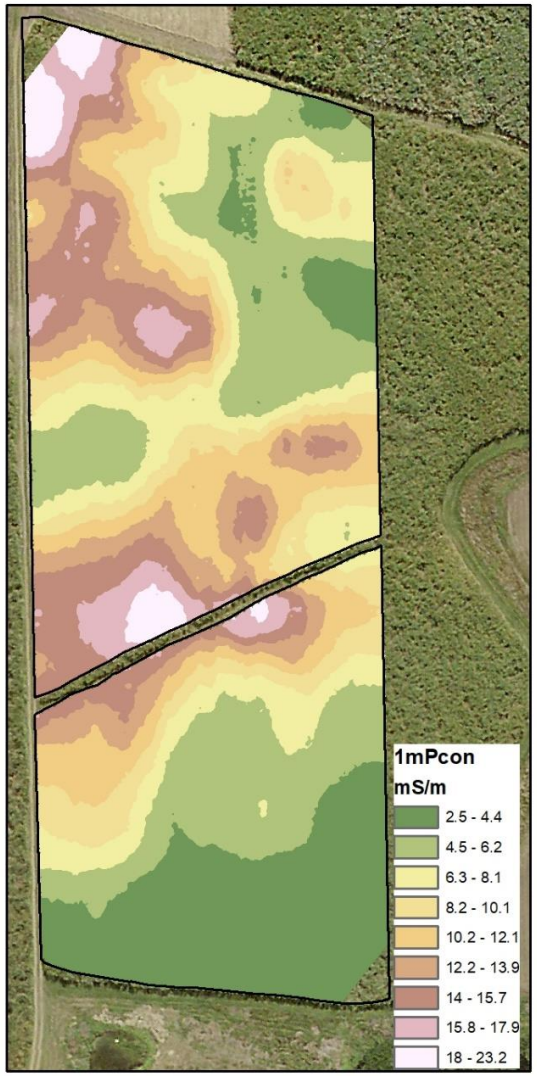


Scale All Maps - 1:2,000

0 50 100

Metres

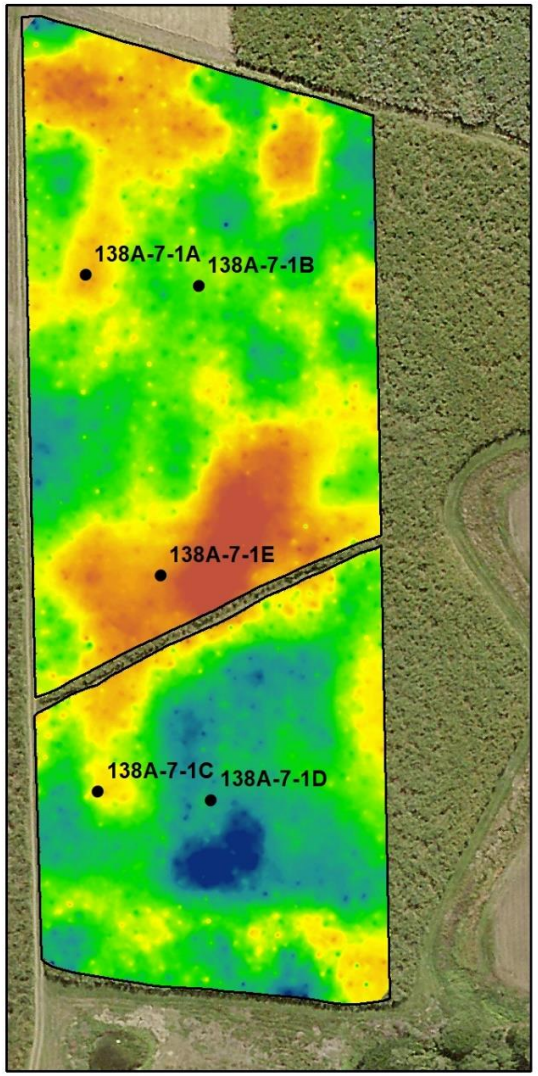
1mPcon



Soil Sampmes
1. 415732.101E, 7939394.174N
2. 415762.134E, 7939414.254N
3. 415627.799E, 7939521.269N
4. 415658.28E, 7939540.727N
5. 415705.375E, 7939460.635N

Above Avg
Avg
Below Avg

Yield 2015 5th Ratoon



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Reduced rates

Treatment	CCS	TCPH	TSPH
Zonal application rate @~100 t/ha wet weight of mill mud.	14.9	90.58	13.49
Traditional application rate @ ~250 t/ha wet weight of mill mud.	14.8	91.33	13.56

Results of the RGS Farming demonstration site- Ingham 2013.
Ratoon crop.

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Reduced rates

Treatment	CCS	TCPH	TSPH
Zonal application rate @~40 t/ha wet weight of mill ash.	13.2	120	15.9
Nil ash.	13.1	114	15.3

Results of the Foresthome Holdings demonstration site- Bambaroo 2014 (sodic soil).
Plant cane.

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Improved farming systems- an example from the Herbert-

An SRA funded project.

Project purpose

Investigate ways to improve the internal soil drainage and yield on heavy clay soils in the Herbert.

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Trial treatments

1. Conventional land preparation
2. Mill ash filled slot on a preformed mound
3. Mound pre wet season and zonal tillage on GPS
4. Mill ash broadcast
5. Bioactivate®, with conventional land preparation

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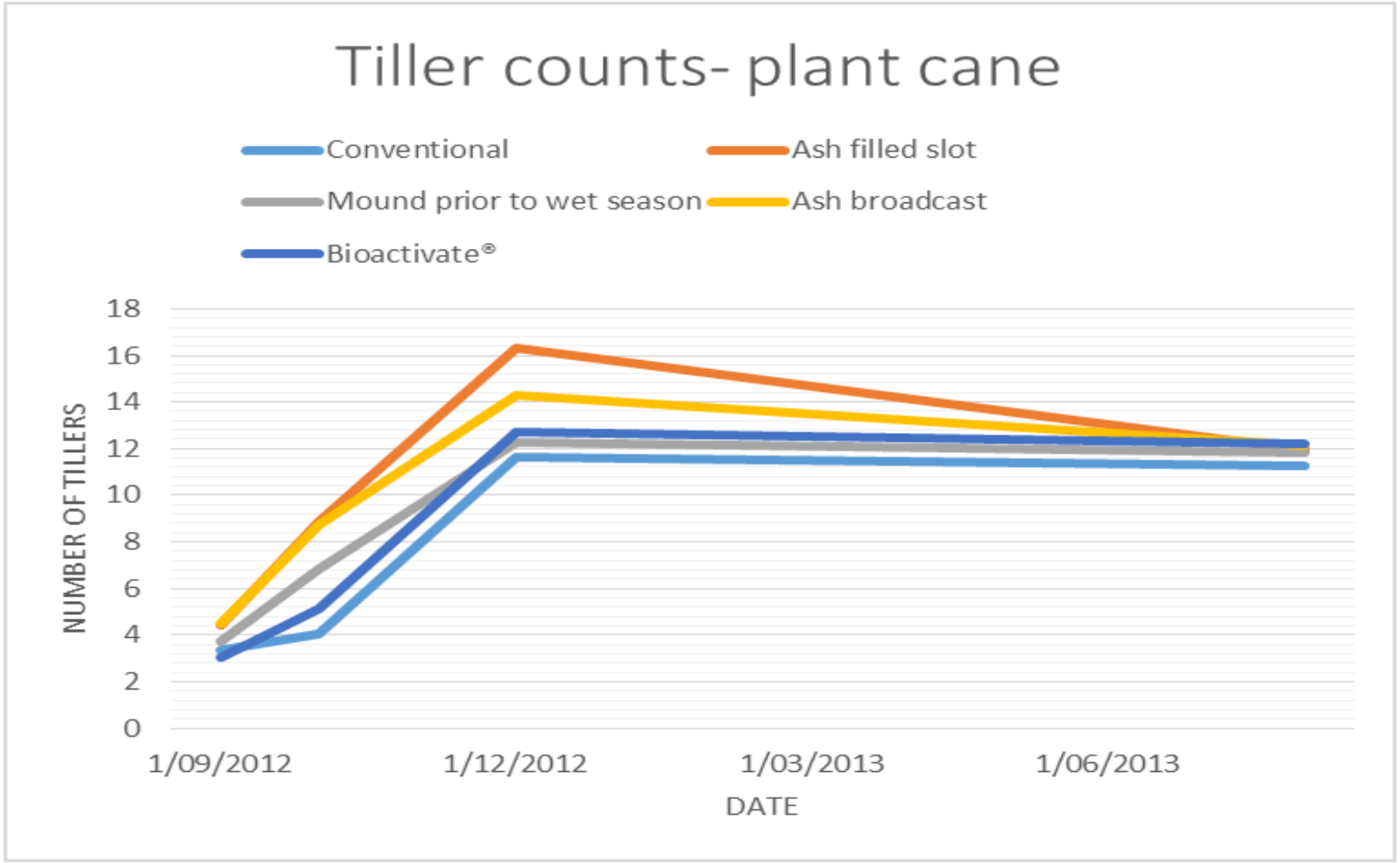
Tiller counts- plant cane.



Tiller counts- plant cane.

Enhanced cane germination
in the broadcast mill ash treatment (on
left) compared to conventional land preparation
(on right).

Improved germination in
zonal mill ash treated treatments
compared to the conventional treatment.

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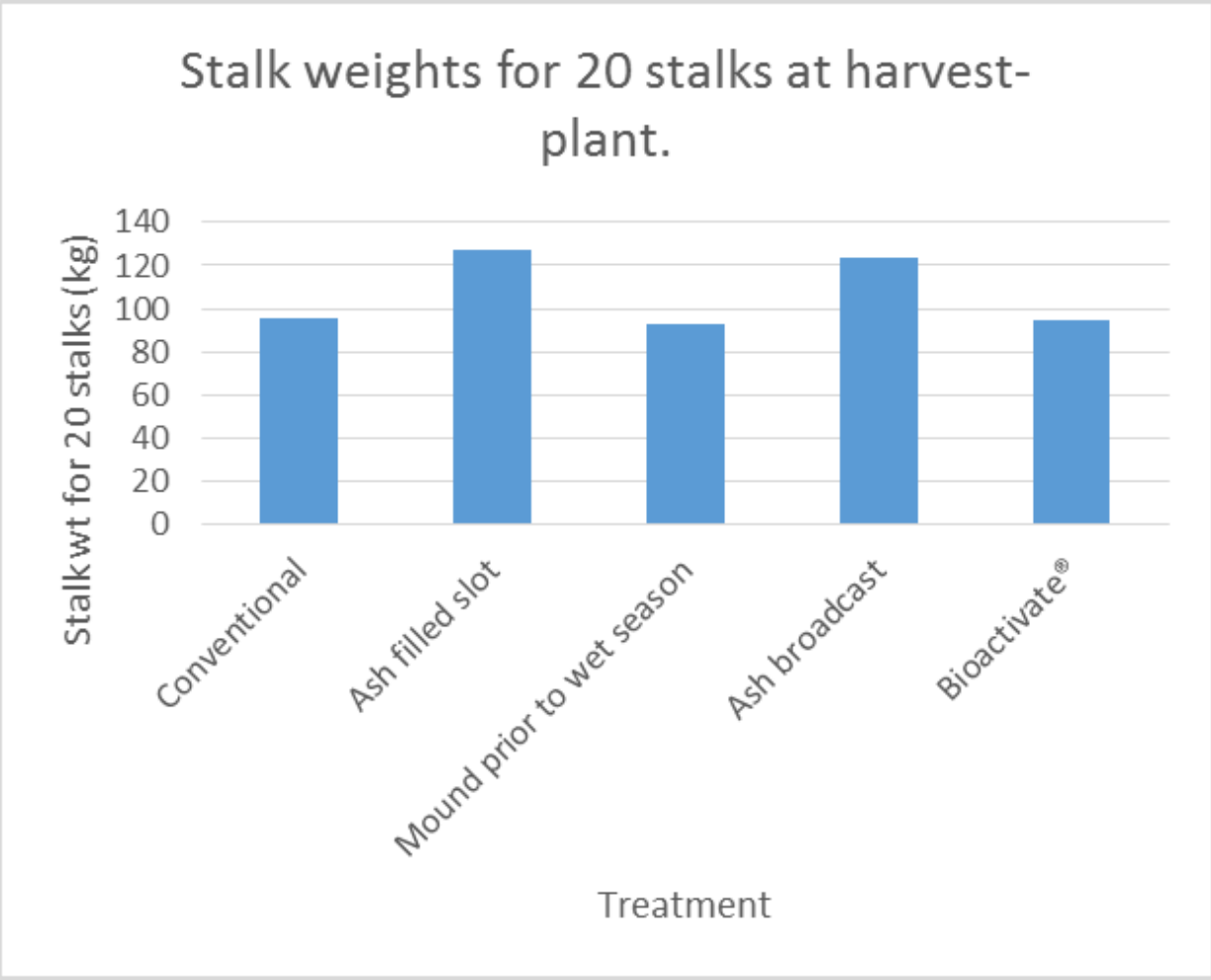
Stalk weights at harvest- plant cane.



Stalk weights at harvest- plant cane.

Left- Broadcast mill ash treatment on the right, compared to the conventional treatment.
Right- Zonal applied ash filled slot on the left, compared to the conventional treatment.

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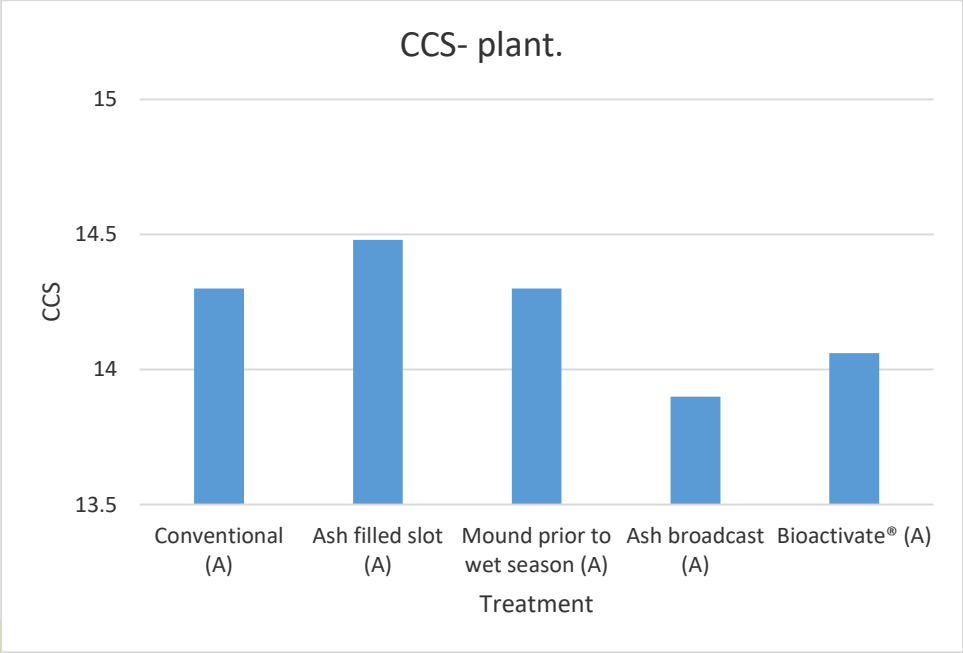
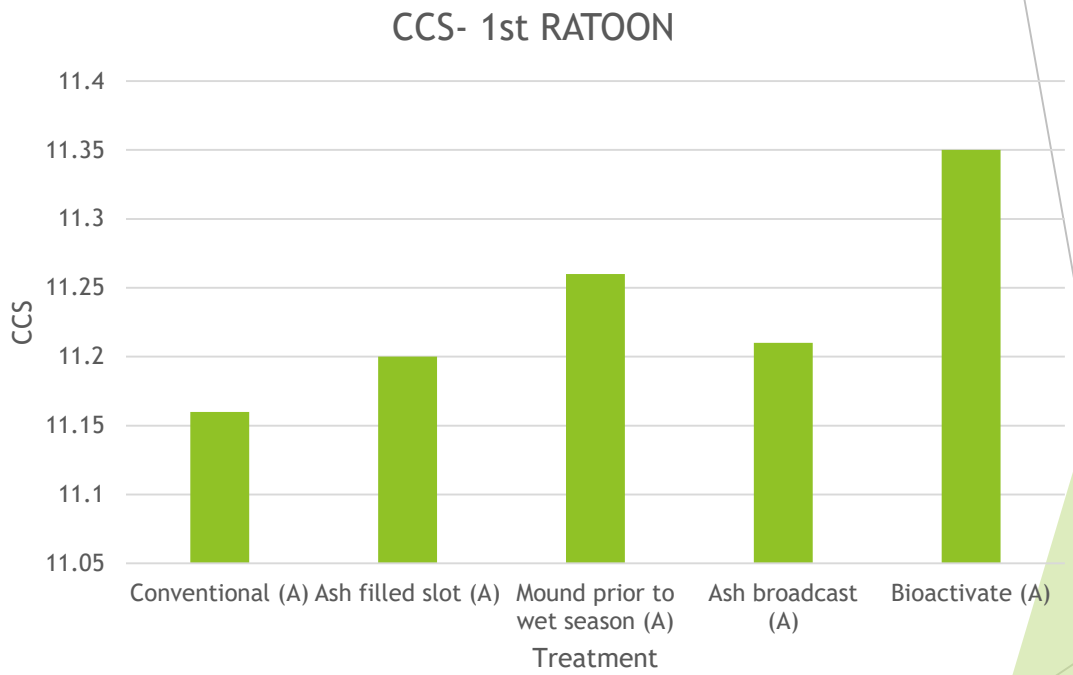
Harvest results





There was no significant difference for CCS between all treatments (lsd 5%).

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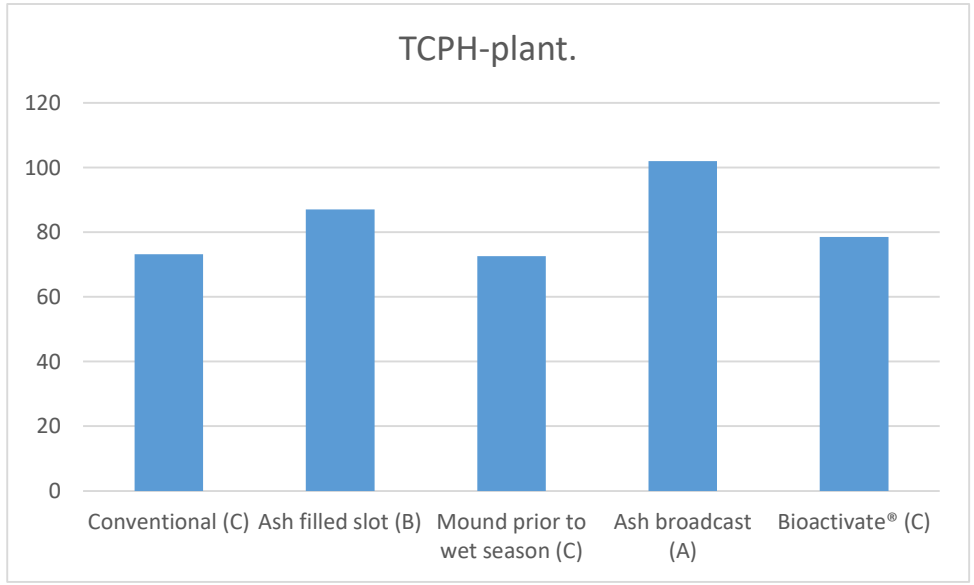
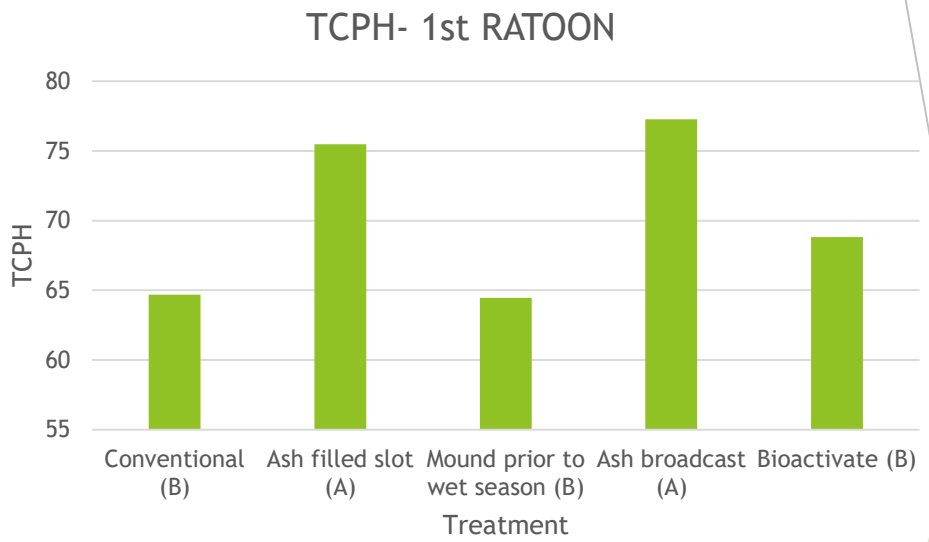
Harvest results





There was significant differences between treatments, indicated by the letters (lsd 5%).

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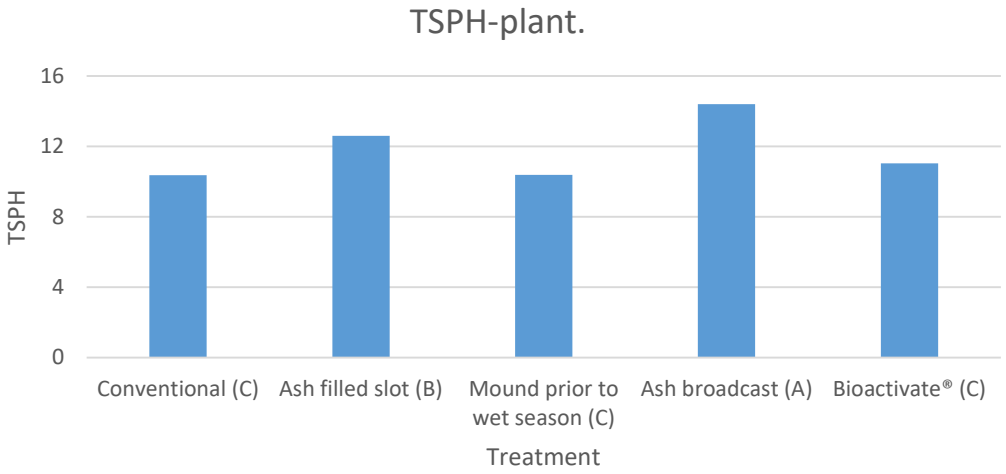
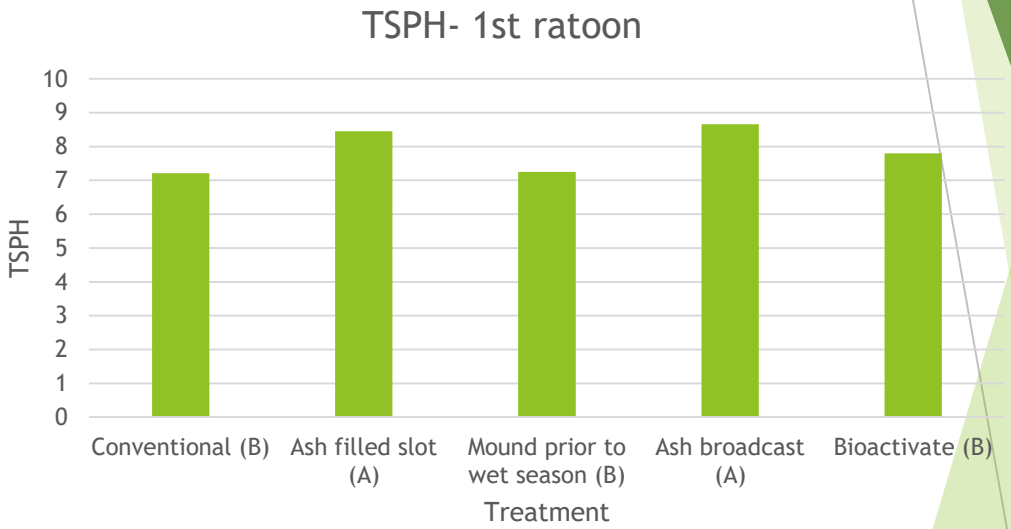
Harvest results





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Growing costs

Growing Costs Fallow ($/ha)

	Conventional Land Preparation	Mill Ash Filled Slot on a Preformed Mound	Mound pre Wet Season and Zonal Tillage on GPS	Mill Ash Broadcast	Bioactivate with Conventional Land Preparation
Growing Costs Breakdown:					
Cultivation	$95/ha	$129/ha	$129/ha	$95/ha	$95/ha
Ameliorants	$363/ha	$468/ha	$363/ha	$750/ha	$363/ha
Weed Control	$84/ha	$84/ha	$84/ha	$84/ha	$84/ha
Total Growing Costs	$541/ha	$680/ha	$575/ha	$929/ha	$541/ha

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Gross Margin Analysis Plant Cane

Gross Margin Analysis Plant Cane ($/ha)

	Conventional Land Preparation	Mill Ash Filled Slot on a Preformed Mound	Mound pre Wet Season and Zonal Tillage on GPS	Mill Ash Broadcast	Bioactivate with Conventional Land Preparation
Income less Harvest Cost*	$2,378	$2,829	$2,360	$3,314	$2,551
Growing Costs Breakdown:					
Cultivation	$406/ha	$321/ha	$321/ha	$406/ha	$406/ha
Planting	$445/ha	$445/ha	$445/ha	$445/ha	$445/ha
Fertiliser	$506/ha	$506/ha	$506/ha	$506/ha	$735/ha
Weed Control	$198/ha	$198/ha	$198/ha	$198/ha	$198/ha
Total Growing Costs	$1,556/ha	$1,470/ha	$1,470/ha	$1,556/ha	$1,784/ha
Gross Margin	$823/ha	$1,358/ha	$890/ha	$1,759/ha	$767/ha

* based on sugar price $440, net of levies/premiums and less harvest cost

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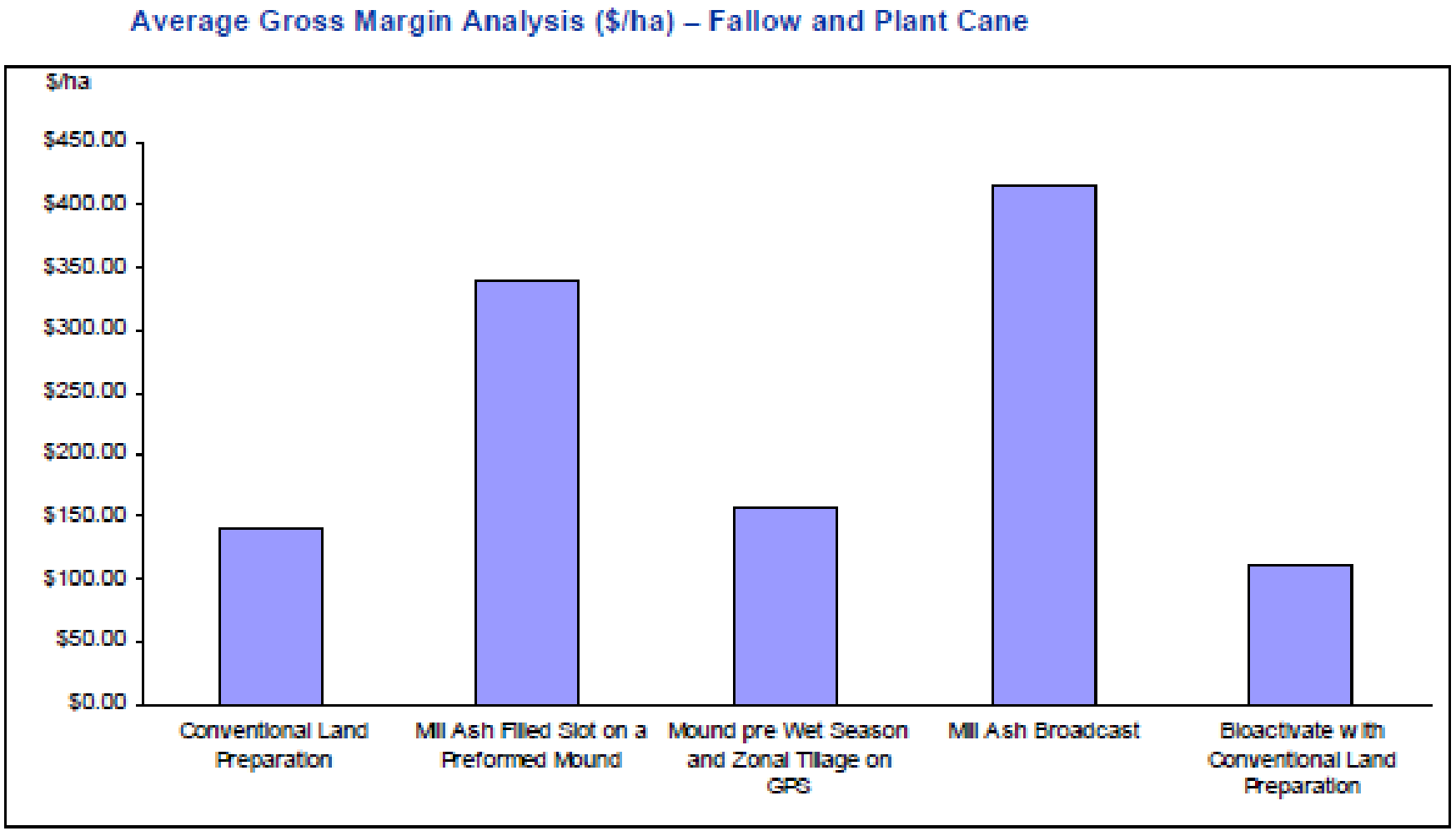
Average Gross Margin- Fallow and Plant



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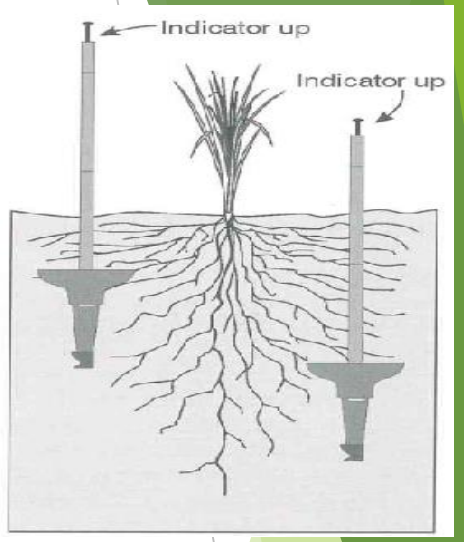
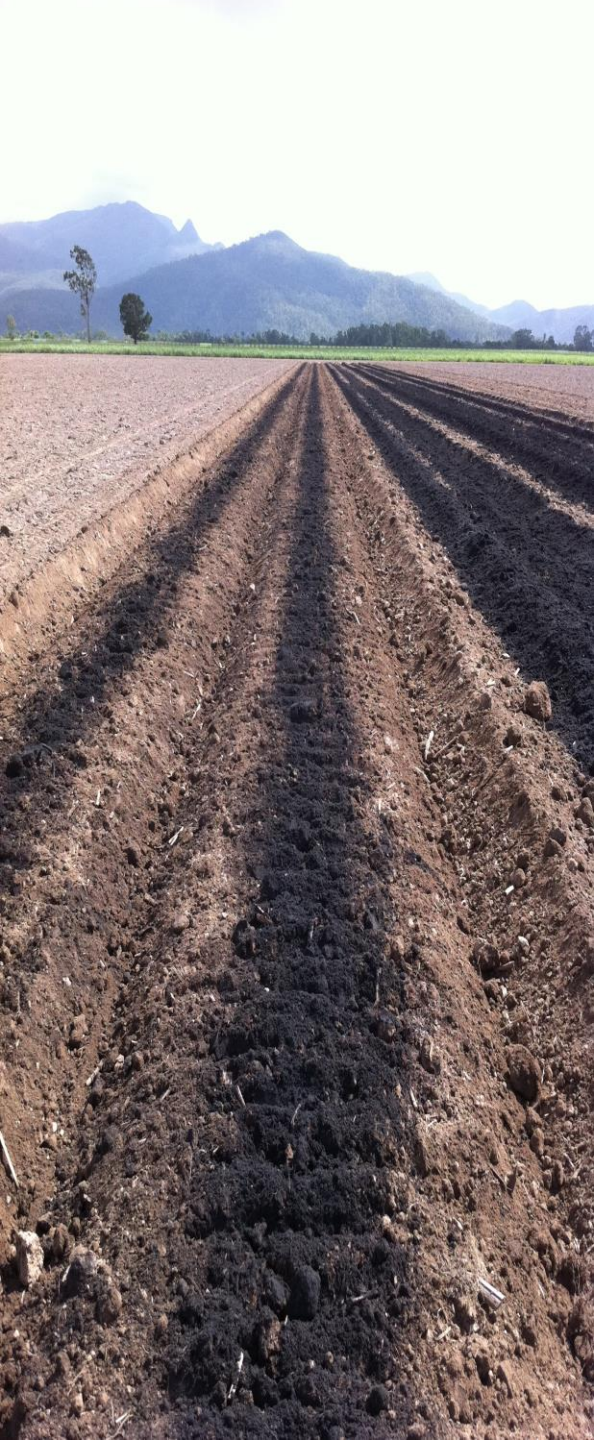
Water sampling results

Full Stop™ Wetting Front Detectors were installed in 2 of the 3 replicates (only enough equipment for 2 replicates could be purchased from the supplier at the time of installation) to assess differences in sub-surface water quality at 1metre depth in the soil profile.

The Full Stop™ Wetting Front Detectors are not a scientific robust piece of equipment and should only be used as indicators of change within a field, refer to www.fullstop.com.au .

There was no significant difference in water quality for nitrogen measured between treatments, however there appears to be natural field variation in nitrogen across the field and some variation between sampling times at the same sample point.





Project conclusions

- The trials indicate that there is significant opportunities to improve cane and sugar yields on heavy clay soils in the Herbert region through the use of mill ash as a soil amendment.
- The use of mill ash was found to enhance germination and establishment of plant cane on difficult to manage clay soils.
- The use of zonal application of mill ash to the cane row will reduce the costs when compared to broadcast applications of the product. The cost of transport from the mill ash from the mill will have a significant effect on the cost of the product; hence zonal application would be more viable as you move away from the sugar mill.

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Overall conclusions

- Mill mud and mill ash offer significant benefits to the industry for the following reasons:
  - As a nutrient source (especially N in mill mud & P in mill mud)
  - As a soil amendment
  - As a source of carbon
  - To improved overall soil health
  - To encourage beneficial' s (like microbial activity)

HEALTHIER SOILS = BETTER CROP HEALTH = MORE PRODUCTIVITY

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ASSESSING THE EFFECTIVENESS OF FUNGICIDES TO CONTROL PINEAPPLE SETT ROT DISEASE IN SUGARCANE, IN VARIOUS CONCENTRATIONS OF MILL ASH.

G. HOLZBERGER[1], N. MATTHEWS[2], L. DI BELLA[1]

[1] Herbert Cane Productivity Services Limited (HCPSL), Ingham, Australia, [2] Nufarm Aust. Ltd, Townsville, Australia.

Trial design: 4 replicates of 5 double eye setts of Q250[A] per pot were infected with pineapple disease and then treated with either no fungicide, Sinker® at 2 rates (50 mL / 100L or 125 mL / 100L) or Shirtan® (125 mL / 100L). Treatments were then planted into pots with a varying mill ash composition in the soil (0% ash, 10% ash, 20% ash, 50% ash and 100% ash. 50mLs of Activator in 100L of water was also applied with fungicide treatments.

Assessments: Germinations were rated weekly over a 9-week period (germination number), and in the final week, billets were sliced open and infection levels rated from 0 – 3 (0 no infection, 3 high level of infection).

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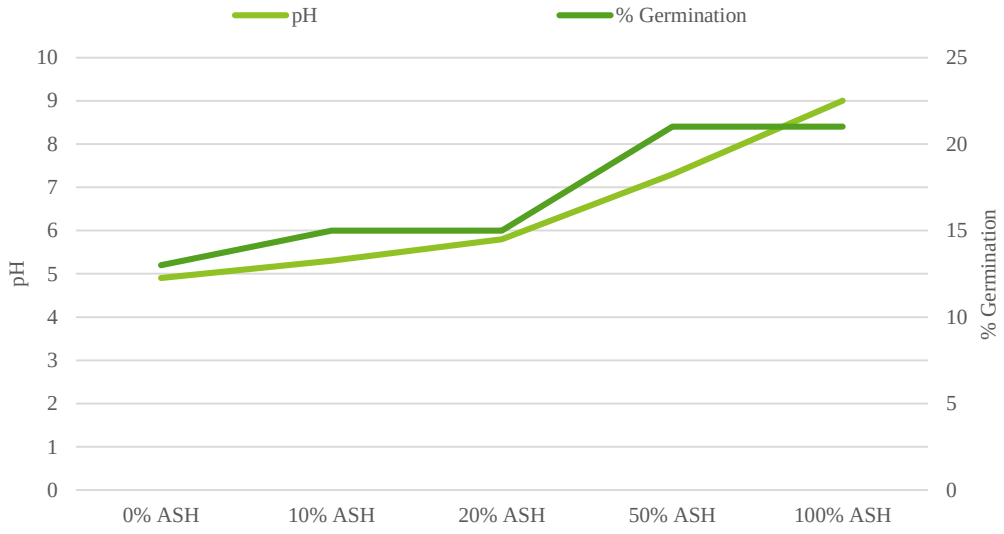
Change in pH of various soil & Mill ash mixtures & % Germination of sugarcane for all fungicide treatments, HCPSL, 2017.



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Results:

No statistical interactions were observed between mill ash and the treatments (P>0.05).

However, there was a significant difference between the treatments alone where germinations were observed highest in the Sinker® at 125 mL / 100L and Sinker® at 50 mL / 100L, then control (no inoculation / no fungicide treatment), Shirtan® 125 mL / 100L and inoculated / no treatment, (Table 1). Setts not treated will fungicide failed to germinate.

There was no significant effect of ash composition on germination with a slight trend to higher germination with increasing ash concentration.

No.	Treatment	Av % Germination (P<0.05)	
1	Control - no inoculation	17	bc
2	Control - inoculated	3	d
3	SINKER 50mL /100L - inoculated	23	ab
4	SINKER 125mL /100L - inoculated	29	a
5	SHIRTAN 125mL/100L - inoculated	13	cd

Thanks.

Any questions?

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