Small Farms Small Grants Round 2

Annual Progress Report – Tier 5

Project ID	SFSG2
Grantee name	HCPSL
Project Title	Assess green waste streams from urban areas in sugarcane
	production systems in tropical Queensland.

Reporting period

Tion 5 year ant	
Ther 5 report	×

Is the project on schedule to finish on time?	Yes		No	\boxtimes
If no, why not? (Include remedy)	There was a d green waste at events in the I it made it inac The program	elay with Town fter the 2019 T Herbert River a eccessible for ma has granted a p	nsville City Co ownsville flood rea in late 2019 achinery to ente roject extension	uncil providing ls and weather and 2020 when er cane fields. n in time.

Do you expect all of the grant funds to be expended by the completion date?	Yes	\boxtimes	No	
If no, why not? (Include remedy)				

Have you received the cash and in-kind contributions that are	Yes	\boxtimes	No	
described in your application?				

If no, why not? (Include	Both HCPSL and BPS will harvest trials after the life of the
remedy)	project (until the crops are ploughed out) as in-kind and to
	ensure that the data is acquired to realise the potential
	benefits associated with the use of green waste streams.

Have you updated your project Risk Management Plan?	Yes	No	\boxtimes
If so what was changed and why? (Include remedy)			

Briefly describe progress against agreed project milestones to date. (100 words)

Have you had any issues resulting in delays or minor changes to project delivery?

There was a delay Townsville City Council providing green waste after the 2019 Townsville floods and weather events in the Herbert River area in late 2019 when it made it inaccessible for machinery to enter cane fields. This meant not all the Herbert trials were established until 2020.

The project has identified that it is not financially viable to transport green waste materials from Townsville to the Ingham or Burdekin areas because of the low bulk density in trucks.

Is there any other information you think we may be interested in for this project?

Project Challenges:

The biggest challenged faced concerning the use of green waste streams supplied to farmers in this project was:

- The inconsistency of quality (especially the material sourced from Townsville City Council).
- Contaminates (plastics, metal, and other materials) in the green waste (material from Townsville City Council had significantly more contaminates when compared to material supplied from Hinchinbrook and Burdekin Shire Councils).
- The low bulk density of the product causing increased costs associated with transport. At this stage it appears that it will be cost prohibitive to source green waste from Townsville into the Herbert and Burdekin cane growing region, unless: Townsville City Council subsides the cost of transport, more efficient transport systems can be put in place to better manage the low bulk density of the product or there is a significant increase in sugarcane yield due to use of the product (equating to an income increase for the farmer). There is an opportunity to use green waste from the
 - Hinchinbrook and Burdekin Shire Council areas.
- Difficulties when applying the product in field because of an inconsistent particle size and texture.
- Heavy metal contamination will need to be monitored and managed by regional councils if they continue to supply green waste to agriculture into the future.

Conclusion:

The use of green waste in a sugarcane farming is still be assessed for soil health benefits and cost effectiveness. There is opportunity for regional councils that are located within sugarcane regions to develop relationships with industry to utilise green waste within the farming system.

Contaminants (like plastics, heavy metals, etc.) in green waste streams will continue to pose concerns and issues for farmers and will need to be addressed by regional councils and the community. There are some significant challenges concerning the handling, transport and contaminants of green waste and these concerns will need to be addressed long term.

The project partners will continue to monitor and assess the trials going forward and will report back to project stakeholders at a later date once trials are harvested.

Thanks to all project co-operators: HCPSL, BPS, Hinchinbrook, Burdekin and Townsville regional councils and the farmers who have hosted trials. This project has been a team effort and has been a worthwhile project. A special thanks to National Landcare for funding the project.

Please send the completed report to: <u>DAWE.Manage@communitygrants.gov.au</u>

Appendix 1.

2021 project results for the Burdekin sugarcane farming regionreport provided by Ehlena Lea of Burdekin Productivity Services.

In order to find a use for an excess of green waste, the Burdekin Shire Council reached out to BPS to see if there would be a way to utilise it as a form of a form of soil conditioner. In the past year the trials have been setup and cane crops have been growing. Treatments such as commercial fertilisers, composts made of different animal manures, mill-mud, waterweed compost and green waste, were included in the trials in the hopes of providing a carbon source.

The green waste provided by the Burdekin Shire Council was mulched to 50mm pieces from tree, garden, and other plant material and pasteurized to kill weed seeds. Care was taken to ensure treated wood was not included in the mulch and samples were sent away for analysis to check for contaminants such as heavy metals.

To investigate the possible benefits of this trial, SRA were partnered with to road test their Soil Health Toolbox as part of their Soil Health Project. They utilized this toolbox at all four sites and undertook in-depth biology sampling at one of the sites.

Four trial sites were established across a variety of soil types, including sandy-loam Delta soils of Kilrie and Burstalls and heavier clay soils of Groper Creek and Giru. The green waste was spread in two different methods: spreading then incorporation at a rate of 200m3/ha and banding into Vs at a rate of 70m3/ha. Other treatments include straight mill mud, mixed mill mud and green waste, green waste, and Easy N fertiliser, decomposed Hymenachne water weed, and compost composed of bagasse, cow manure, chicken manure and mill mud.

To allow for the ameliorant products to break down, the paddocks were left fallow for three to four months before being planted in March-April 2020.

Burstalls

TCH – both the control and GW did not perform as well as the other treatments at this trial site. The compost yielded the highest tonnes of cane per hectare.

CCS – there was no significant differences between the treatments, except for the control, which had the highest CCS.

TSH – there was no significant differences between the treatments, except for the green waste, which had the lowest tonnes of sugar per hectare.

Overall – no conclusions can be made from this data, more is needed. In this trial, green waste did not perform as well as the other treatments.

Burstalls			
Treatment	тсн	CCS	TSH
Control	170.4	14.2	24.2
GW	169.7	13.7	23.3
Water Weed	173.4	13.9	24.2
Compost	177.7	13.4	23.9
GW+WW	177.2	13.7	24.3







Haughton

TCH – All the treatments had minimal differences between them, except for the GW+MM, which yielded the lowest (7 tonnes less than the next treatment).

CCS – all the treatments, except GW, performed very similarly. The GW treatment was 0.5 less than the others.

TSH – the control and mill mud out-performed the GW and GW+MM by 0.8 tonnes.

Overall – no treatment was consistently poorer or better than any other. As there was no trend that could be established from the data, no conclusions could be made.



Haughton







Groper Creek

TCH – there was no significant difference between the treatments, except for GW which was lower than the rest by 6.5 tonnes.

CCS – there was no significant or noticeable difference between the treatments.

TSH – as there were no major differences between the treatments in CCS, the TSH graph mirrors the TCH graph. GW performed the worst of the treatments.

Overall – none of the treatments affected the CCS of the crop. GW did not perform as well as the other treatments in terms of tonnes of cane. More data is needed to see a trend.



Groper Creek						
Treatment	тсн	CCS	TSH			
Control	146.42	13.52	19.80			
GW	131.74	13.76	18.13			
MM	143.40	13.77	19.74			
Compost A	138.20	13.48	18.62			
Compost B	145.54	13.57	19.75			





Kilrie

TCH – the control performed the worst out of all the treatments and GW+Easy N performed the best, 8 tonnes above the control. The GW treatment produced 3.6 tonnes more than the control.

CCS – there was no significant difference between the different treatments.

TSH – again, control performed the worst out of all the treatments and GW+Easy N the best.

Overall – no conclusions can be drawn, more years of testing need to be performed, however for the first year GW+Easy N performed the best.



Kilrie			
Treatment	ТСН	CCS	TSH
Control	154.08	13.87	21.37
GW	157.66	13.80	21.75
MM	158.77	13.73	21.80
GW+N	162.27	13.75	22.30





Concluding comments

Overall, there were no significant trends that could be seen between any of the trial sites, as there is only one year of data. Individually there were significant differences between treatments, however these did not translate when compared to the other trial sites. The different sites all yielded different results when comparing GW to control. Different treatments did better in different areas within the Burdekin. A site and treatment that was of particular interest was Kilrie, where the Greenwaste+Easy N performed much better than all the other treatments. There is no clear evidence to suggest why this could be, further investigation is needed to draw conclusions. It is theorised that the green waste plots will perform better in the coming years as the materials are given a chance to break down and become available to the plants.

This trial requires more years of study and possibly more trial sites to draw any definitive conclusions. BPS and the participating growers are interested in further investigating the progress of the Green Waste Trial sites beyond the life of this project.

Appendix 2.

2021 project results for the Herbert sugarcane farming region- report provided by Richard Hobbs from Herbert Cane Productivity Services Limited (HCPSL).

In 2019 with the changing government legislation and the reduction of land fill at urban waste facility a Green Waste trial was initiated. Herbert Cane Productivity Services Limited (HCPSL), Townsville City Council (TCC) and Hinchinbrook Shire Council (HSC) established a working group to investigate the use of green waste in a sugarcane farming system. The aim of the project was to reduce the volume of green waste going into landfill and to try and find a use that was sustainable and suitable for the environment. It was envisaged that agriculture was be the best opportunity to achieve the desire results.

A series of trials in the Herbert sugarcane region were conducted to assess the viability and application techniques need to use green waste products.

Bambaroo trial site #1.

A trial was planned to commence in late 2019, this consisted of finding suitable farmers, sites, transport, and application systems. This site was abandoned due to the poor quality of the green waste material being available and the lateness of the year with the onset of the wet season.

Bambaroo trial site #2.

Another site was selected in 2020 that consisted of a uniform soil type (refer to figure 1) in block 6-3, in the Bambaroo area.

Figure 1. Soil type map for the site.



MOLONGA; 0.1 - 0.2m dark to grey-brown sil;ty clay to light medium clay A1 MI horizon over sporadically bleached A2 horizon to 0.25m over acid to alkaline mottled yellow-brown to grey medium to heavy clay B horizon to 1.2+m



This farmer was able to collect and transport green waste material from TCC for the trial. The green waste material for this trial was ground into a 50mm size, with the product being very dry. A full semi tipper of 30m³ weighed only 6600 kg's (being a very low bunk density).

The trial designed was a randomised complete block design. The product was applied on 16 July 2020 into the furrow and covered over with 15-20 cm of soil (subsurface). The application bands were 30 cm wide and 10-15 cm deep in the furrow on a 1.80 m row spacing. At the same time Mill Mud/ Ash and Poultry Biodigester product were also applied to the same application system as the green waste.

Figure 2. Trial design for the Bambaroo trial site #2.

1.8m		Road End							
Buffer 7 rows ~0.32 ha Irrigation hydrant on 1st row	Green Waste 6 rows ~0.32 ha	Mud/Ash 6 rows ~0.32 ha	Control 6 rows ~0.32 ha	Poultry Waste 6 rows ~0.32 ha	Mud/Ash 6 rows ~0.32 ha	Control 6 rows ~0.32 ha	Poultry Waste 6 rows ~0.32 ha	Green Waste 6 rows ~0.32 ha	Buffer 6 rows ~0.32 ha
	Rate	Rate		Rate	Rate		Rate	Rate	
	25 yna	95 t/lia		9 t/lla	95 t/lia		9 t/lla	25 t/lla	
No Product	Application 8 tonne	Application 31 tonne Farmer standard practise	No Product	Application 3 tonne	Application 31 tonne Farmer standard practise	No Product	Application 3 tonne	Application 8 tonne	No Product

Row width

R O W

> 3 0 0

Μ

Creek End



Photos 1 and 2 (above). Incorporating green waste at the Bambaroo site.

Table 1. Application costs per product.

Treatment	Cost / tonne applied (\$)	Product cost/ha (\$)
Control	0	0
Green waste @ 25t/ha	30	750
Mill mud/ash @ 95t/ha	8	760
Poultry biodigester @ 9t/ha	90	810

The trial was harvested on the $13^{\text{th of}}$ July 2021.

Refer to Table 2 for the plant cane harvest results. The project will assess the impact of each product applied throughout the sugarcane cropping cycle (approximately 5 years). Industry experience using mill mud / ash indicates that it will still be showing benefits after 5 years. Green waste and poultry biodigester long term benefits are unknown at this stage.

Treatment	Average cane yield (t/ha)	Average CCS	Average sugar yield (ts/ha)
Control	80.0	14.36	11.48
Green waste @ 25t/ha	87.5	14.3	12.47
Mill mud/ash @ 95t/ha	86.2	13.35	11.84
Poultry biodigester @ 9t/ha	83.9	13.5	11.30

Table 2 (below). Plant cane harvest results.





Photo 3 (above left)- The delivery of green waste to the trial site.

Photo 4 (above right)- The green waste received from TCC (note contaminants in the green waste).

Bambaroo trial site #3.

This trial was laid down on 21 October 2020. Due to availability of green waste from HSC this trial commenced in 2021. The sugarcane was planted on the 7th of July 2021. This trial will be harvested in 2022 and thereafter.

Figure 3. Soil type map for the site #3.





Row width-1.80m

GULLY END

Guard Rows	GWM @ 15t	GWM @ 30t	GWM @ 30t	Control	M/A @ 15t	MUD / ASH	Guard Rows
		+ MI/A @ 30t				@ /5 1	
3 Rows	3 Rows	3 Rows	3 Rows	3 Rows	3 Rows	3 Rows	3 Rows
No Product	GWM - 6 TONNE	GWM - 12 TONNE	GWM - 12 TONNE	No Product			No Product
		MUD/ASH - 12			MUD/ASH - 15	MUD/ASH - 30	
		TONNE			TONNE	Farmer standard practise	
Lime	Lime	Lime	Lime	Lime	Lime	NO Lime	NO Lime

Key:

- GWM= green waste material
- M/A= mill mud /ash

Photo 5 (below left)- Mill mud/ash is applied to the field.

Photo 6 (above right)- The green waste and mill mud/ash applied to the field.







Photo 7 (above)- Sugarcane planting at the trial site.

Concluding comments

At trial site #2 the green waste treatments had the highest average cane yield in the plant crop, followed by the chicken biodigester, mill mud/ ash and the control treatments.

Lower CCS levels were experienced with the mill mud/ash and chicken biodigester treatments when compared to the other treatments at trial site #2. Lower nitrogen levels should be applied to the mill mud/ash and chicken biodigester treatments to address the lower CCS issues.

Soil tilth improvements in the green waste and mill mud/ash treatments have been noticed at trial sites 2 and 3 when soil was being cultivated for planting sugarcane. This will be of benefit on heavy clay soils in the Herbert region, especially in relation to germination and establishment of plant cane.

On a 4th site HCPSL has been working with Wilmar farms staff to look at amelioration of sodic soils using green waste. Results to date are very promising with increased early cane growth, improvement in soil structure and improved water retention. The site was planted in 2021.

HCPSL and HSC met the 27th of October to secure all available green waste in the shire for further trials and demonstration sites to be established on sodic and saline soils in the region. It is estimated that HSC would only have only enough green waste to be applied to 200 hectares annually, considering that the Herbert sugarcane industry farm approximately 67,000 ha in the Hinchinbrook Shire area. If green waste material from HSC is supplied free of contaminants and at a cost-effective price, there is a significant opportunity for both the local shire council and the local farming industry to have a win-win situation going into the future.

HCPSL will harvest trial sites # 2 and 3, again in 2022. Trial results will be available in the 2022 report to Landcare.