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ATHERTON TABLELANDS SOIL MICROBIAL CONDITIONER TRIAL

2019 2020

A collaborative project between

Cape York Natural Resource Management Ltd. (Cape York NRM)

And

Sweeter Soils Holdings Pty. Ltd. (Sweeter Soils)

Contract Number – CY239

Trial Site Location

Petersen Farm

571 Merragallan Rd. Malanda Qld. 4885





INTRODUCTION

Sweeter Soils has been using Biological Soil conditioners and Biology simulators to enhance soil health and pasture quality and quantity across Far North Queensland in both wet and dry tropics pastoral enterprises. Results have been positive and to demonstrate the advantages of using soil biology for pasture improvement as an adjunct with normal fertiliser applications or without, Sweeter Soils agreed to partner with Cape York NRM to undertake a trial in the wet tropics at Malanda. The project description is provided below.

Project description

Atherton Tablelands Microbial Soil Conditioner Trials

The Governments Water Quality Improvement Plan calls for a reduction in particulate and dissolved nitrogen entering the Great Barrier Reef lagoon. The presence of high nitrogen levels have been linked to the degradation of the Reef including an association with crown of thorns starfish outbreaks. This project will ultimately help to address these issues and contribute to the practice change, Education and extension in reef catchments project by providing a valuable tool (demonstration site) for producer engagement and education.

Sweeter Soils proposes to collaborate with Cape York NRM, Terrain NRM and Bioactivesoils over the coming year (minimum 12month trial), to assess the Sweeter Soils range of soil microbial products. This will determine if they can provide an economic and water quality benefit for intensively grazing businesses in the Atherton Tableland area, and lead to a reduced reliance on inorganic fertiliser applications.

Expected results:

- Significant long-term reduction to the amount of inorganic nitrogen currently applied to pastures for maintaining pasture health and animal (Beef Cattle) productivity.
- Improving the quality of run-off from intensively grazed pastures by improving the amount of nitrogen that can be sequestered away from any water courses.
- A demonstration site utilised by producers for engagement and education purposes (to demonstrate the economic and water quality benefits of improving soil microbial health).

Project activities will include:

- Soil, water and plant tissue testing across the demonstration site.
- Applications of microbial soil conditioners across the demonstration site.
- A field day (including educational workshop) on site early 2020.

Testing Required:

- 4 x totals soil tests with biological report in the first year and ongoing in commencing years if required.
- 4 x Totals soil tests with biological report in May 2020 for progress report and first year outcomes.
- 12 x Comprehensive feed tests and a report for first year by May 2020.
- A water test if deemed necessary mid-project.



Overall, the trial was carried out to schedule. Several uncontrollable events however

1. Cold weather caused frost damage to the pasture late winter rendering pasture sampling not possible
2. Covid-19 restrictions caused the abandonment of the proposed field day for May, 2020

PETERSEN BIOLOGY TRIAL - PROPOSED PROCEDURE AND ACTUAL - 2019/2020

Proposed Activity		Actual Activity	
Date		Date	
May-19	Farm Visit to view Trial site Meet property owners Discuss proposed trial, procedures, Responsibilities Plan and design trial layout	16-05-20	Farm Visit to view Trial site Meet property owners Discuss proposed trial, procedures, Responsibilities Plan and design trial layout
Jun-19	farm Visit to lay out trial blocks Carry out initial sampling Supply product for trial	04-06-19	farm Visit to lay out trial blocks Carry out initial sampling Supply product for trial Assess Plant diversity in all blocks
Jun-19	Product application	06-06-19	Product application with wet weather
	Trial successfully initiated		Trial successfully initiated
Sep-19	Farm visit to view trial Pasture sample Deliver product for 2nd treatment	19-09-19	Farm visit to view trial Farm frost affected - pasture sampling delayed Delivered product for 2nd treatment
Sep-19	Product application	Sep-19	Product application with wet weather
May-20	farm visit to assess trial Take Soil samples Collect pasture samples	May-20	farm visit to assess trial Take Soil samples Collect pasture samples Assess Plant diversity in all blocks
May-20	Field Day	May-20	Field Day - Abandoned due to Covid-19
Jun-20	Reporting	Jun-20	Reporting

This report summarises activities and results to date and should be accepted as the final assessment of the 1st years activities and results.

TRIAL LAYOUT

Given there were 3 different treatments in the trial to be compared with an untreated control area the trial area was divided into 4 X 1.0 Ha blocks with buffer areas between them. Block boundaries were marked with paint and flagging tape.

Cape York NRM Trial Site





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PRODUCTS USED

Sweeter Soils works with a range of products which contain active soil biology as well as soil biology stimulating products. A short description is provided below. Please view the sweeter soils web site www.sweetersoils.com.au for more detailed information.

Bactivate Liquid (Block 1)

Bactivate Liquid contains 3 different types of active Bacteria. It is applied mixed with Bioboost and Seaweed in water.

Bactivate Plus Liquid (Block 2)

Bactivate Plus liquid contains 5 different types of active Bacteria. It is applied mixed with Bioboost and Seaweed in water.

Product X (Block 4)

Product X is a developmental product which will soon be commercially available. It is a powder which contains Trichoderma as well as a number of Soil Fungi. It is mixed with water and applied without any stimulants.

Applications are most effective in wet weather so as products are washed down into the soil. Both applications in this trial were carried out in wet weather events.



RESULTS

SOIL FERTILITY

Soil sample results are summarised and compared in Table 2 and Progress reports 1 to 4 which accompany this report. No fertiliser was applied to any trial areas during the trial period.

Initial Soil samples - June 2019

Initial soil sampling showed that the soils in all blocks were similar in fertility. In general fertility was good with reserves of major elements (Totals) which were available enough to support pasture growth.

Final Soil samples – May 2020

Block 4 (Product X) showed good increases in available Calcium, Magnesium, Phosphorous and Nitrogen while maintaining Total soil levels.

Block 1 (Bactivate Liquid) Showed good increases in total Calcium, Magnesium, Potassium and Phosphorous.

Block 2 (Bactivate Plus liquid) showed good increases in Total Calcium, Magnesium and Phosphorous.

Soil Biology

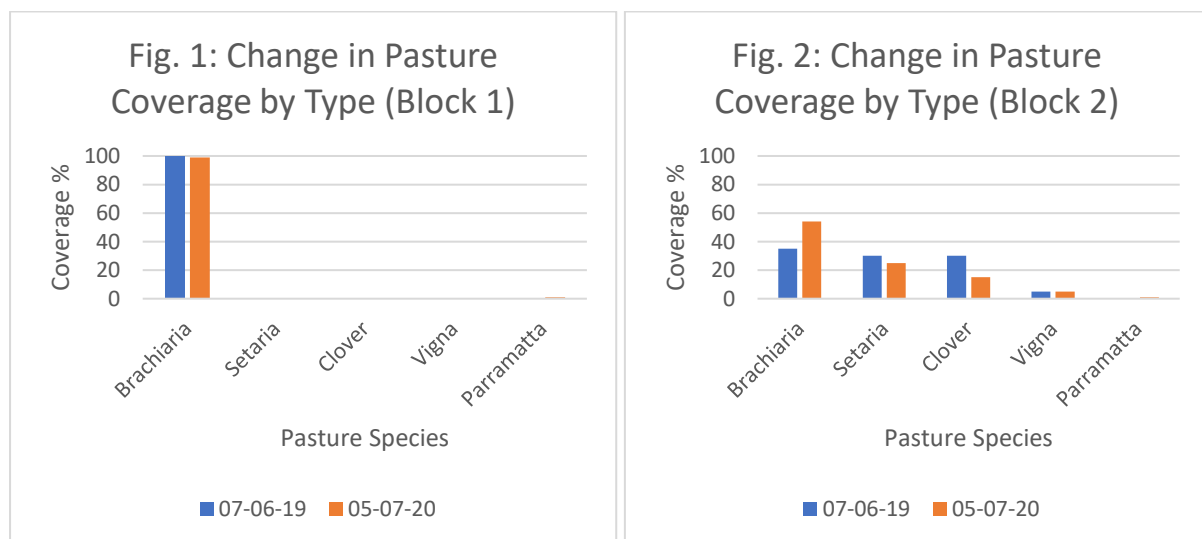
Soil biology assays are listed in Table 2 and discussed in Progress reports 1,2,3 and 4 which accompany this report. Soil Biology Total populations have decreased in all blocks over the trial period. Lactic acid populations have decreased in all blocks. In general, treated blocks (1,2 and 4) have slightly better balance but it is too early to draw any conclusions.

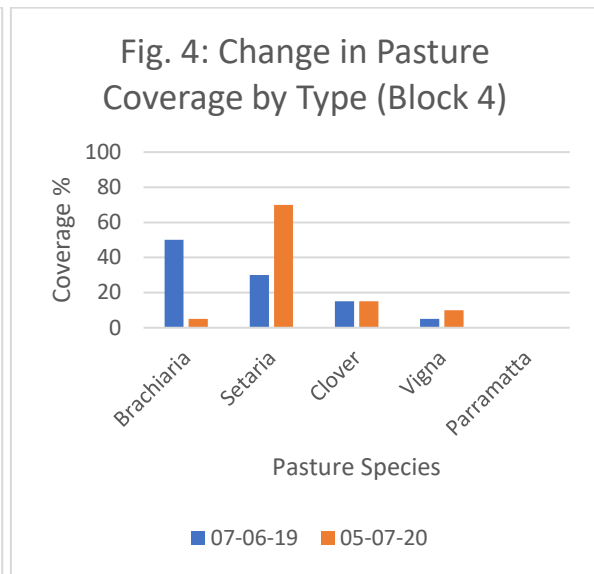
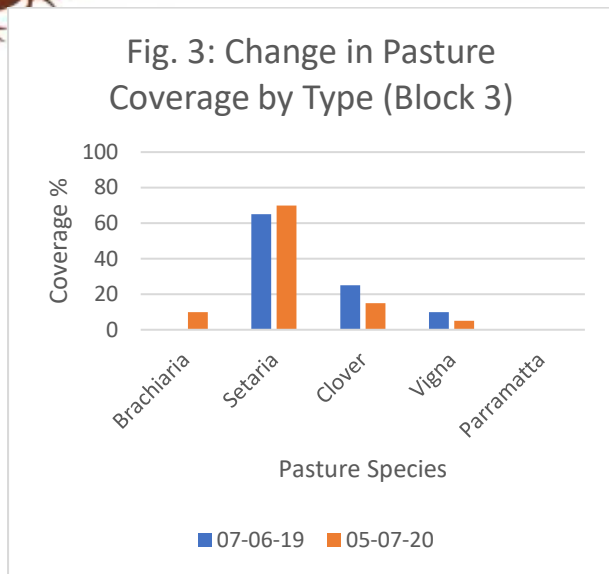
PASTURE

In the initial sampling (June 2019) a composite pasture sample combining all blocks was taken for analysis. Subsequently (May 2020) a sample was taken from each block for comparison. There is a change in pasture species diversity across the trial blocks with only Brachiaria being present in all blocks. A sample of Brachiaria from each individual block was also taken for comparison.

Pasture Species Diversity

Figures 1 - 4 compare pasture species variation across blocks and time.





What the data suggests is that both the Bactivate liquid products supported Brachiaria pasture growth over Setaria, Clover and Vigna.

Product X however supported Setaria and Vigna over the other species.

More work needs to be done in this and other trials to test these results.

Pasture Quality – Feed Test

Pasture samples were submitted to Agri Food Feed Test for standard NIR analysis. Two factors, Crude Protein and Estimated Metabolizable Energy are considered the important measures of pasture quality. Results are summarised in Figures 5 - 8.

All recent pasture samples had higher nutritional values than the original composite pasture sample.

Fig. 5: Comparison of Est. Metabolisable Energy by Block (General Pasture Species)

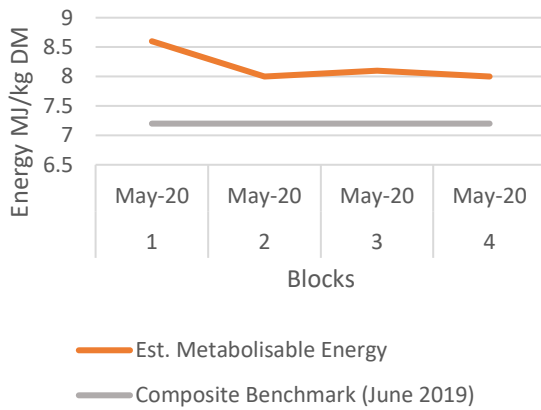


Fig. 6: Comparison of Crude Protein by Block (General Pasture Species)

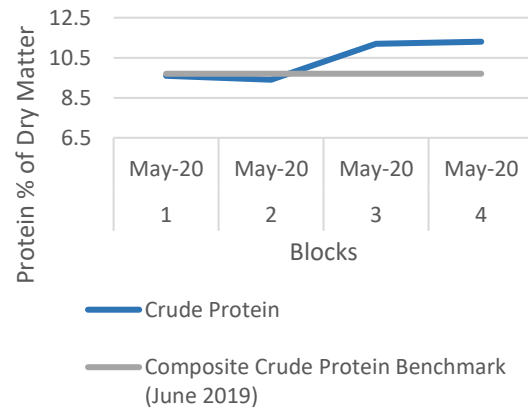


Fig. 7: Comparison of Est. Metabolisable Energy by Block (*Brachiara* spp.)

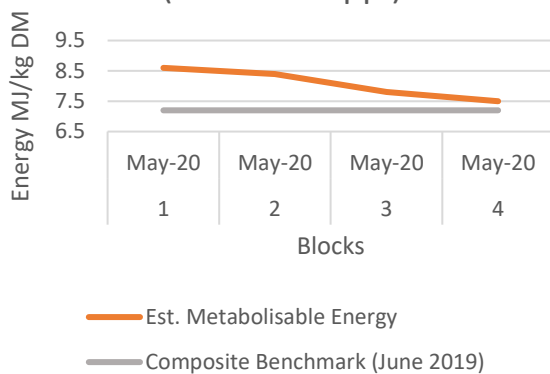
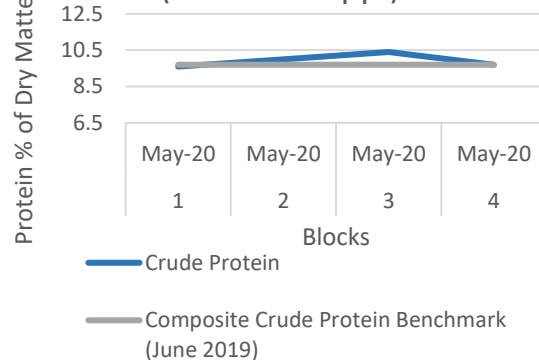


Fig. 8: Comparison of Crude Protein by Block (*Brachiara* spp.)



Total Pasture

Block 1 (Bactivate Liquid) pasture had higher Estimated metabolizable energy than all other blocks.

Blocks 3 and 4 had higher Crude Protein probably reflecting the *Setaria* dominated pasture types



Blocks 1 (Bactivate liquid) and Block 2 (Bactivate Plus liquid) had significantly higher Estimated metabolizable energy than other blocks supporting the idea that the bacteria in both products promote Brachiaria growth.

Crude protein values were essentially the same across all blocks.

SUMMARY AND CONCLUSIONS

Soil nutrition

At the start of the trial all blocks had similar nutrition which could be considered good for old Tableland grazing land.

Treatments of soil biology have helped free up and make available major elements as well increase total reserves in the top 150 mm of soils sampled.

Minor elements are mixed

Soil Biology

Total Active Populations in all blocks have reduced over the time of this trial. Treated blocks have moved slightly to being more balanced while untreated block 3 is totally fungal dominated.

Pasture Diversity

Pasture treated with Bacterial products (blocks 1 and 2) has stayed dominated or moved towards being dominated by Brachiaria. Pasture treated with Fungi (block 4) have become more Setaria dominated while control block 3 remained relatively unchanged.

Estimated Metabolizable energy is highest in the Brachiaria blocks treated with Bactivate bacteria (blocks 1 and 2) – when considered as total pasture or Brachiaria only.

Crude protein is higher in the mixed species blocks dominated by Setaria

RECCOMENDATIONS

The Petersen trial has so far Demonstrated some positive movements in Soil Nutrition as well as pasture composition and nutritional value. The trial should be continued for the next 2 years to demonstrate whether the changes can be increased and proven.

Further trials should also be initiated, perhaps in more poorer soil conditions to demonstrate further the value of biological inputs in grazing enterprises.

ACKNOWLEDEMENTS

I would like to thank Cape York NRM for supporting this trial. It shows great foresight to investigate the efficacy application of soil biological in grazing environments. Biological products whether for soil, plants, or pest and disease control are the new frontier in agriculture and will only become more common and accepted in the mainstream.

I would like also to Thank Mr ken Petersen and the Petersen family for their co-operation in this trial. Ken's help and professional attitude to the whole trial process ensured the trial's success.



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