CARBON FARMING CASESTUDY

THE FRUIT SALAD PROJECT - HORTICULTURE

THE ISSUE

Nitrous oxide is a greenhouse gas. Increases in the concentration of nitrous oxide (N20) in the atmosphere have been associated with global warming and climate change. Almost 80% of these nitrous oxide emissions are produced by agriculture, with 73% emitted from agricultural soils.

ABOUT THE PROJECT

The Fruit Salad Project was a joint initiative of the Australian Melon Association, NSW Department of Primary Industry and QLD Department of Agriculture and Fisheries, to investigate how nitrous oxide emissions in commercial melons, bananas and blueberry crops could be reduced, and soil carbon increased, with the use of compost and biochar.

Funded by the Australian Government through the Action on the Ground programme, this partnership worked with growers in northern and central NSW and southern QLD.

Bree Grima (BFVG) and Justine Cox (DPI) assess rockmelon harvest at trial site.

PROJECT LOCATION

The trials were set up on rockmelon farms in Griffith and Bundaberg, two banana farms near Ballina and Lismore and a blueberry farm near Byron Bay in NSW.

The rockmelon trial in Bundaberg was implemented on Swan Ridge Farm, a commercial mixed cropping property. Bundaberg is located in the Wide Bay region and is a major food bowl of the state, producing a variety of fruit, vegetables, herbs, nuts, sugarcane, grain, meat and livestock. It has a subtropical climate of wet, hot summers, mild winters and a mean annual rainfall of 1027mm.

TRIAL TREATMENT AND DETAILS

All trials were established with the same amendments, and with the same monitoring of soil, crop yield and greenhouse gases (N20, C02 and CH4).

Prior to the trial commencing, researchers conducted baseline soil physical characterisation and nitrous oxide sampling of the block. This was to ensure the trial was positioned within an area of reduced variability.

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The Fruit Salad Project trial consisted of four replicates of each treatment:

- Control (no soil amendment) with standard fertiliser
- Biochar with standard fertiliser
- Compost with standard fertiliser
- Biochar plus compost with standard fertiliser.

Soil amendments were commercial quality, plant residue and chicken manure based and applied at rates equivalent to four tonnes of carbon per hectare. This was an important factor, to ensure all treatments received an identical carbon application irrelevant of its source.

Four tonnes of carbon per hectare resulted in the following application rates:

- Compost – 16t/ha
- Biochar – 8t/ha
- Biochar and compost combination – 8t/ha compost, 4t/ha biochar.

Amendments were banded and worked in lightly to the top ten centimetres of soil and applied only once for the entire trial. Scientists monitored soil moisture, compaction, soil nutrition, soil carbon and nitrous oxide emissions throughout the crop cycle.

The three-year project followed a typical horticultural rotation plan for the Bundaberg region. It commenced in Spring 2014 with a rockmelon crop which was followed by a Winter zucchini crop in 2015, and another rockmelon crop in Spring 2016.

The zucchini crop was followed by a fallow or green manure crop of sorghum to assist in managing soil erosion, increasing soil fertility and importantly reducing pathogen and pest presence.

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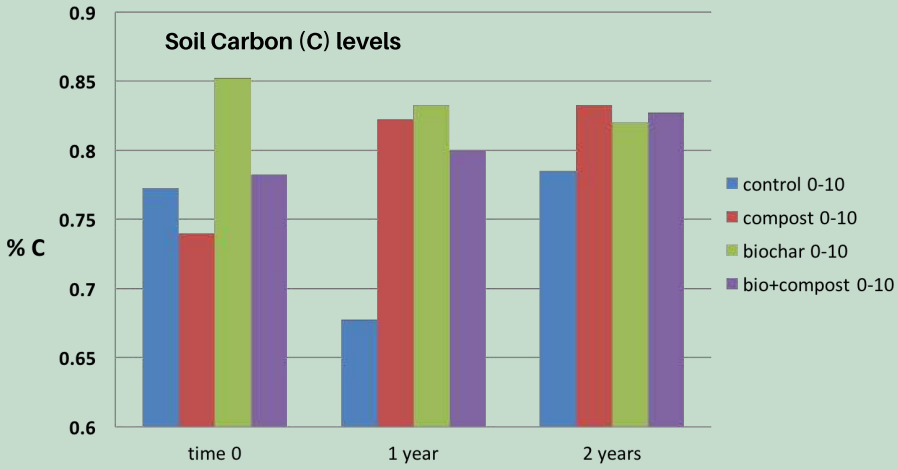
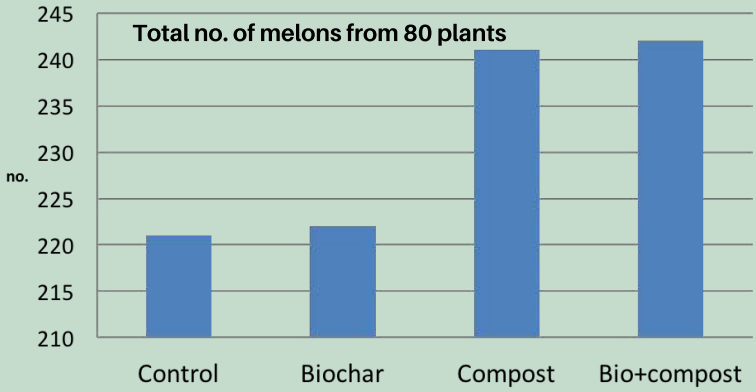
RESULTS

- Biochar reduced nitrous oxide emissions by 19%
- Compost increased nitrous oxide emissions by 36%, mostly at the start
- Amendments increased soil Carbon by 18-22% after one year but this returned to similar levels at two years
- Higher CEC and calcium levels in the compost treatment
- Higher labile Carbon in biochar and biochar+compost treatment
- Lower ammonium N across all treatments
- Little difference in soil pH, total N, Colwell P, salinity (EC) across all treatments
- Lower soil compaction in all treatments





SUMMARY

The biochar and compost additions did not increase soil Carbon at the applied rates, but were effective in increasing soil moisture retention and reducing compaction. The addition of amendments were also found to have had little effect on the soil chemistry however the addition of biochar was effective in reducing nitrous oxide emissions.

The compost treatment increased overall productivity with an increase in melon numbers in year one, zucchini weight and numbers in year two, and improved percentage of marketable melons in year three.

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SUMMARY (CONT.)

The implications from this trial are that biochar has the potential to reduce N20 emissions in some crops/soil types (which means that it improves N use efficiency).

Compost increased yields slightly, reduced compaction and may be more economical than biochar. Amendments may also be effective in reducing losses in produce from fungal diseases.

ACKNOWLEDGEMENTS

The Fruit Salad Project was funded by the Australian Government through the Action on the Ground Programme and was led by the Australian Melon Association with assistance from NSW Department of Primary Industries (DPI) and the QLD Department of Agriculture and Fisheries (DAF).

This casestudy is an initiative of the Bundaberg Fruit and Vegetable Growers (BFVG) and the Carbon Farming Project; a joint project with the Burnett Mary Regional Group, funded by the Australian Government. Graphs, scientific data and images for this casestudy were provided by DPI and DAF.

ABOUT THE GROWER

Swan Ridge Farms is a family run operation by 3rd generation growers Tony, Brent and Julie Attard. They grow a diverse range of fruit and vegetables including capsicum, zucchini and rockmelon.

Brent and Julie wanted to be involved in the trial to learn more about use of soil amendments in their cropping system, nitrous oxide emissions from agriculture, and increasing carbon in soil.

On the Attard's property, family and employees that worked on the project

Australian Government | Burnett Mary Regional Group | Bundaberg Fruit & Vegetable Growers | NSW Department of Primary Industries | Australian Melon Association Inc. | Queensland Government