

Biochar showing positive benefits for organic vegetable grower in Darwin

Introduction

The Darwin Soil Wealth/ICP site on David Boehme's property was set up to showcase several organic approaches that are now considered to be best practice for the broader horticulture industry.

David Boehme is one of Australia's most experienced organic farmers and he suggests that "every farmer should first learn to farm organically to understand soil biology, beneficial predators, useful non-chemical approaches, and sustainability.

David's organic farm at Lambells Lagoon, 47km east of the Darwin CBD, is demonstrating cover crops, biochar, reduced tillage and managing pests and disease in an integrated manner.



Figure 1. David Boehme at his Lambells Lagoon property.



Figure 2. Cover crop trials at Lambells Lagoon.

The Trials

The Darwin Soil Wealth/ ICP demonstration site aimed to provide information on cover crops, row covers and biochar on David's organic vegetable farm, specifically:

1. What are the benefits of different types of cover cropping?
2. How do floating row covers effect on pest management and crop health?
3. Does biochar help to address soil carbon deficiencies and improve water holding capacity?

The demonstration site and the trials on David's property are run as a collaborative project between the Territory Natural Resource Management (TNRM), NT Farmers and Soil Wealth/ICP.

Caroline Biggs from TNRM was responsible for data collection, analysis and project communication and also for funding the biochar component of the project. Greg Owens from NT Farmers and the National Vegetable Extension Network (NVEN) has also been involved the trials and in communications about the demonstration site.

It is a successful collaborative partnership between TNRM, NT Farmers and the Soil Wealth/ICP teams, and one which is proving to be very beneficial for NT vegetable growers.

The demonstration trial layout is shown in Figure 3. The cover crops being evaluated were sorghum, cowpeas and mung bean, and these are compared to a bare soil control. Half the trial area had biochar applied before planting at 5t/ha. On 5m long sections of each plot, floating row covers were placed over eggplant to help understand whether the covers help to control insect pests on the farm.

The trial was not intended to be a replicated scientific trial, rather, to provide a practical on-farm demonstration of these commonly used soil improvement methods under Darwin conditions, on an organic vegetable farm.

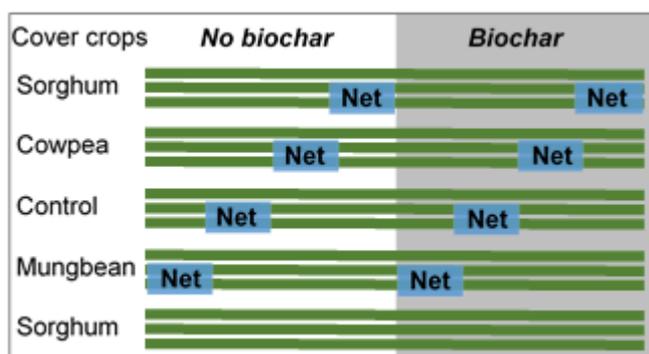


Figure 3. Layout of the 2016 Darwin demo site.

Abnormal weather conditions, including an unusually dry wet season, meant the cover crops were able to grow for only 48 days before being cultivated into the soil, prior to planting. The cover crops were planted in late January, 2016 and incorporated in mid-March 2016. During that time, they produced the following amounts of fresh biomass. Sorghum produced 60t/ha, cowpeas 35t/ha and mung beans 20t/ha.

Cultivation treatments applied during the trial are outlined in Table 1. Eggplants were harvested on 23 occasions – from June to September 2016, and the data is presented in Figure 4.

Table 1. The soil treatments applied to each plot during the trial

Cover crops	Soil disturbance	
	No biochar (5 t/ha)	Biochar
Bare soil	No cover crop. Weeds incorporated into soil.	No cover crop. Weeds incorporated into soil. Biochar incorporated into soil at 5t/ha.
Sorghum, mung beans and cowpeas	Cover crop sown 3 times (2 failures) and incorporated into soil, extra tillage over control.	Cover crop sown 3 times (2 failures) and then incorporated into soil. Biochar incorporated into soil.

Results

There were some marginal impacts on biochar in increasing the soil CEC and organic matter in the trial area (Table 2), however, the cover crops did not produce any clear beneficial result over the trial period.

Table 2. Impact of biochar and cover crops on cation exchange capacity (CEC) and soil organic matter. Soil tests were taken in August 2016.

Cover crops	CEC (meq/100g)		Organic Matter (%)	
	No biochar	Biochar	No biochar	Biochar
Bare soil (0-15cm)	4.7	6.1	2.7	2.3
Sorghum (0-15cm)	5.4	6.0	2.0	2.3

Mung bean (0-15cm)	5.2	5.9	1.8	2.4
Cowpea (0-15cm)	4.5	5.8	1.7	2.1

The 5t/ha biochar area with no cover crop (control) resulted in a yield of 32t/ha which was about 50% higher than the non-biochar treated plots which were mainly in the 14–18t/ha range. The other interesting yield result was in the mung bean cover crop area, where the yield in the biochar treated area was again double that the non-biochar area (Figure 4).

The control area received more tillage than the plots planted with cover crops, and this may have been a factor in the results. Biochar is worthy of further investigation in the area, especially in combination with mung beans as a cover crop.

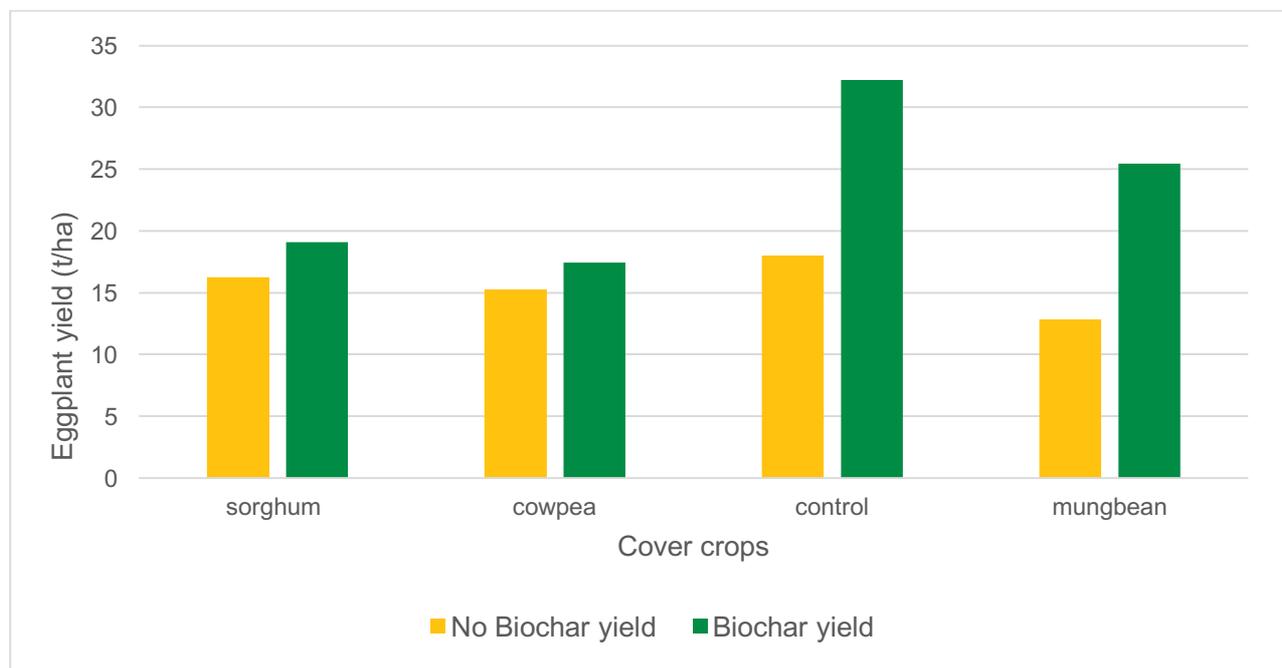


Figure 4. Cumulative yield of eggplant harvested over three months.

The grower and his agronomist both observed that the row covers (veggie nets) did provide some protection against wind, birds, and sunburn. However, mites easily penetrated the nets and were not controlled. Click on the link for more on row covers: <http://ahr.com.au/?s=row+covers>

We look forward to the coming year with David at Lambells Lagoon and appreciate his passion for organic and sustainable farming in the NT.

Acknowledgements

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