

# Beechwood Biological Solutions Newsletter

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## Parra Trooper news

Following on from our 2017 Landcare award, the last six months has seen us present a poster to the International Organics Conference and a paper to the Queensland Weeds Symposium. We've become involved with Soil C Quest, received a visit by weed researchers from Florida and we're preparing to dig a soil pit.



Jeremy & Cathy in the laboratory

## Parra Trooper is Soil Trooper

We've wasted considerable time and money to discover our registered trademark is worthless so we're changing the name of our *Nigrospora oryzae* soil ameliorant to **Soil Trooper**. Production is behind schedule but if you want to be on the waiting list, call Cathy on 0448 562 024.



Professor Brent Sellers and PhD candidate Jose Dias, experts in weedy *Sporobolus* grasses, putting *Nigrospora* crown rot under the microscope

## NSW North Coast weed biological control survey

If you're in this part of the world, NSW Department of Primary Industries want your input to guide biocontrol projects for weeds on the North Coast. The survey closes on April 30<sup>th</sup> but it only takes a few minutes

## Soil C Quest 2031

A non-profit group of farmers and scientists working together to fix the climate by fixing the soil. Soil C Quest is a registered charity, so if you have a bit of philanthropic capacity, you know what to do. Visit Soil C Quest [here](http://www.soilcquest.org.au). [www.soilcquest.org.au](http://www.soilcquest.org.au)

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## Check out our latest Article in The Land

### Arid fungi that sequesters carbon in exchange for root exudates might save crops in a drought

Written by Jamie Brown – 19 April 2018



Jeremy Bradley and Cathy Eggert, Beechwood via Wauchope, have commercial experience isolating useful fungi, some of which can sequester carbon in the soil for hundreds of years which will also boost soil health.

Soil without biology is geology, according to “bio-pro prospector” Jeremy Bradley, a member of the group Soil C Quest which is exploring the use of fungi to boost agricultural yield – while sequestering atmospheric carbon dioxide.

“There is biology that fixes nitrogen or holds soil together and biology that helps to process nutrients,” Mr Bradley said. “But the new kid on the block is the endophyte. Scientists, over the past few years, have discovered there are fungi living inside the roots of every plant on earth that help them to thrive, especially in harsh environments.”

Endophytes can process locked-up phosphorus, reduce drought stress or protect plants from pest and disease. The most valuable, Dark Septate Endophytes, find a home in arid environments. These fungi are dark because of their melanin which is almost pure carbon and this excites members of Soil C Quest, led by Forbes agronomist Guy Webb.

Last January, during one of those extreme heat waves that lash the semi-arid plains west of Cobar and Nymagee, this small group of keen scientists and committed farmers ventured into a shimmering expanse.

Dressed in long sleeves and big hats they looked for plants showing signs of vigour and dug them up, roots and all. Among those thriving in the oven-like environment were kangaroo and wire grasses, *Panicum* and *Poa*, defying a soil temperature of over 50 degrees Celcius, measured 50mm below the surface.

“Only mad dogs and Englishmen were out in that heat,” mused Mr Webb. “But the more extreme the environment, the more plants rely on their friend the fungi.” In fact, Mr Webb’s team found some of the desert grasses ringed with soil carbon as a direct result of that relationship.

The primary goal of this volunteer group is to create a user-friendly soil inoculant from Australian endophytes that will build enduring carbon aggregates, deep in the soil, by drawing down atmospheric carbon.

At the same time this fungal association should benefit crops, like wheat and canola, by increasing their capacity to absorb water and nutrients – especially during drought.



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This is particularly important for Australia which, according to CSIRO soil scientist Roger Gifford, has lost 40 per cent of its original soil carbon since the introduction of western agriculture.

Forbes agronomist Guy Webb leads a group called Soil C Quest, whose primary goal is to create a user-friendly soil inoculant from Australian endophytes that will sequester carbon in the soil, by drawing down atmospheric carbon.



Volunteer members of the group Soil C Quest found plants showing signs of vigour and dug them up, roots and all. Among those thriving in the oven-like environment were kangaroo and wire grasses, *Panicum* and *Poa*, defying a soil temperature of over 50 degrees Celsius, measured 50mm below the surface.



Only mad dogs and Englishmen were out in the noon day sun west of Cobar, where soil temperatures below the surface were above 50 degrees Celsius. And yet plant life survived, with a little help from fungi.



This very unusual fungi sequesters aggregates of melanised carbon in return for sugars from plant roots. Members of Soil C Quest are excited by this find.

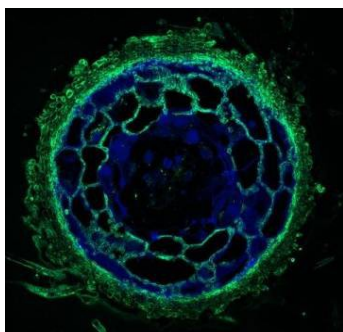
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Bands of green show where melanised fungi were injected into the soil using a Yeomans plough provide inspiration for farmed land in more arid regions.



Fungi hyphae surrounding plant cell walls, seen in this stem cross-section, exchange water and nutrients for plant carbohydrates.

Soil with greater carbon levels not only hold more water, they are also less acidic, as shown here in core samples. The bottom core is from Jeremy Bradley's farm at Beechwood where lower stocking and biological intervention in the past ten years has resulted in greater carbon storage. The core at the top, taken only meters away, is from a neighbouring property



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The Soil C Quest project is based on peer-reviewed research done a few years ago by Associate Professor Peter McGee and Dr Tendo Mukasa Mugerwa at the University of Sydney. They found that 20 melanised endophytic fungi increased carbon by up to 17 percent over 14 weeks in aluminium and iron rich soils. Two of these fungi increased organic carbon within micro-aggregates, and that which means it will be stored for a long time.

While linear carbon – created from plant carbohydrates – will revert to carbon dioxide in the presence of oxygen and water, poly-aromatic carbon, built by fungi, will not. Its tough, ring-like structure can hold a resilient form of carbon that has been shown to stay in-situ for hundreds, even thousands of years.

“Take roots and soil and put fungus in between and suddenly you have stable soil carbon,” explained Mr Webb, who pointed to trials in carbon rich soil, greater than 6 percent, as well as in poor soils at just 1pc among a crop of canola, that proved endophytes significantly increase soil carbon levels and can sequester carbon dioxide from the atmosphere in the order of 130 tonnes/ hectare per decade.

“Considering there is something like 800 million hectares of cultivated land worldwide, if we could employ agriculture to do that job the numbers would add up,” said Mr Webb.

## Commercial reality not far

Farmer and microbiologist, Jeremy Bradley was a member of this bio-prospecting venture and later grew out samples of fungi in his on-farm laboratory at Beechwood, near Wauchope.

“Individual fungal strains are selected as they emerge,” he said. “Some are highly melanised with black tendrils that promise greater carbon storage potential.

“Once we have identified the fungi and are sure that we haven’t captured a ‘cane toad’, we will make our first seed treatments for pot trials with crop and pasture species”.

Mr Bradley, working with his partner Cathy Eggert, has already commercialised one of the first ever endophytic fungal pasture inoculants, Parra Trooper. The fungi, *Nigrospora oryzae*, was originally found by the NSW Department of Primary Industries, to initiate a crown rot in Giant Parramatta Grass.

“*Nigrospora oryzae*, however, is an all-around good fungi”, Mr Bradley says “It helps break down dead organic material and it assists with feeding both the soil and the pasture.”

Now, Mr Bradley is excited by the prospect that his innovative work with Parra Trooper could help turn wild desert fungi into products that could be used to help farmers beat the biggest challenges of our times.

Meanwhile, a new documentary about Soil C Quest’s ambitions called “Grassroots” this week won an international science documentary award at a film festival in Vancouver. It will be shown in Palace Cinemas across Australia from May 31 – June 21.



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## Hastings Landcare Farm Gate Tour

Not only are we opening our farm gate this June long weekend as part of the Farm Gate Tour, we're opening a soil pit and inviting people to take an in-depth look at our healthy soil. We're only going to do this once, so don't miss the opportunity. Click [here](#) for info and bookings.

# The Hastings Landcare Farm Gate Tour 9-11 June 2018

GREATER HASTINGS - PORT MACQUARIE - CAMDEN HAVEN



\$30 per self drive tour booklet



Booklets available 16 May 2017

Online at [www.hastingslandcare.org.au](http://www.hastingslandcare.org.au)

Hastings Landcare - 44 Cameron St, Wauchope - Ph: (02) 6586 4465

Ecowild - 21 High St, Wauchope

Port Macquarie Visitor Info Centre, 'The Glasshouse' - Clarence St, PMQ



Hastings Farm GateTour

[hastingslandcare](#)

Meet Local Farmers and Land Custodians  
Enjoy a family friendly day exploring the backroads of the Hastings region

sheep  
organic herbs  
open range poultry  
biodiversity conservation  
pasture raised pigs  
cattle breeding  
bushfoods  
oysters  
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