



Case Study

NutriSoil®
Biological Liquid Fertiliser



NutriSoil® helps the Haggertys improve productivity with reduced inputs

Who

Dianne and Ian Haggerty
Prospect Pastoral Company
Wyalkatchem, WA

What

Cropping – cereal grain and hay crops

Grazing – merinos bred for premium-grade fat lambs and wool

Aims

- Improve soil health
- Improve soil water holding capacity
- Improve soil microbial activity
- Remove hard pan from soil
- Reduce reliance on artificial inputs in cropping and grazing systems
- Improve productivity

Background

Ian and Dianne Haggerty farm approximately 8000 hectares of land in Western Australia's central wheatbelt, around 190 kilometres north east of Perth. After six years of conventional farming the Haggertys realised that their system was vulnerable to dry seasons. Input costs were steadily increasing without corresponding increases in productivity. Soil tests showed adequate nutrient levels, but tissue tests revealed nutrients were not getting to plants, despite a comprehensive mineral fertiliser program. To top it off, rainfall in recent years had been less than half the annual average often falling in 3–5 mm events followed by windy weather, meaning much was lost to evaporation. Maximising crop production in dry years had become a real struggle and hard pans in their soils were severely restricting root growth.

So the Haggertys started to research biologically-based farming systems with the aim of increasing their soils' microbial population, nutrient availability and moisture holding capacity.

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"Our Prospect Merino Pasture Fed Lambs are fed on nutrient dense pastures so we're producing nutrient dense lamb. International research suggests this lamb is higher in healthy omega-3 fatty acids."

Why NutriSoil®?

To transition from conventional to biologically-based farming, the Haggertys started using a combination of compost extract and humates as well as a variety of other microbial foods and trace elements.

After meeting Rachelle Armstrong, Director at NutriHealth International, at an Elaine Ingham Soil Biology Course, the Haggertys discovered NutriSoil®. Initially, the Haggertys applied NutriSoil® at 10 L/ha but steady improvements in soil health as well as a tightening of the purse strings during tougher years have seen that rate reduced to 3–5 L/ha. Seeding and NutriSoil® injection is done in one pass using a Flexi-Coil air seeder fitted with a liquid cart.

Investment in biological farming pays off

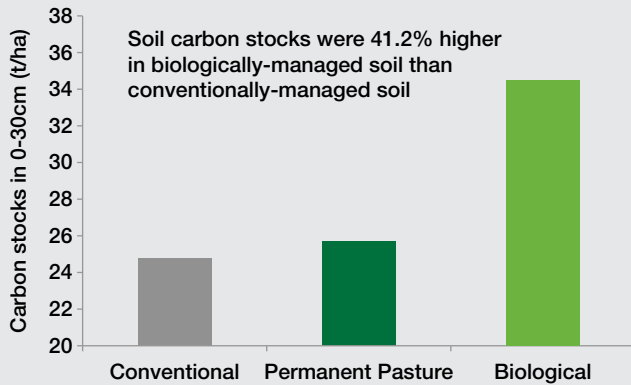
The Haggertys recently conducted some deep soil carbon testing to examine the impacts of biologically-based farming on their soils. Soil farmed with their biologically-based system was compared to conventionally-farmed soil on a neighbour's property as well as soil under permanent pasture. Soil nitrogen stocks and water-holding capacity were also measured.

Data was collected using National Soil Carbon Research Program (SCaRP) protocols with five replicates in each of three increments (0–10cm, 10–20cm and 20–30cm).

"On some paddocks biological farming has helped us grow continuous wheat crops for seven years with good yields for the conditions and minimal disease."

Soil carbon stocks

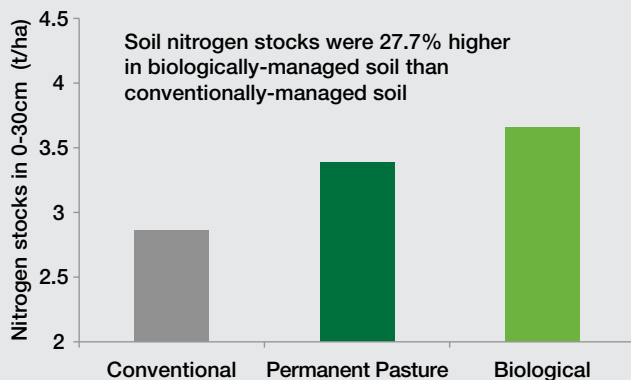
Soil carbon stocks were 41.2% higher on average in the biologically-managed soil compared to conventionally-managed soil. This amounted to an extra 10.26 t/ha of soil carbon in the biologically-managed soil. Soil carbon levels have a major impact on soil health. Soil carbon improves the physical properties of soil and improves soil water holding capacity as well as increasing cation exchange capacity (CEC) and helping soils to store nutrients and make them available to plants.



Improvements in soil carbon were more pronounced at depth, as stocks were 53.6% higher in the 20–30cm increment of the biologically-managed soil compared to the conventionally-managed soil. Soil carbon in the biologically-managed soil was 9.3% higher than the carbon levels of soil under permanent pasture.

Soil nitrogen stocks

Nitrogen stocks were 27.7% higher in the biologically-managed soil compared to the conventionally-managed soil. This equated to an extra 794 kg/ha of nitrogen in the biologically-managed soil, even though almost no nitrogen had been applied. The biologically-managed soil also had an almost 8% increase in soil nitrogen compared to permanent pasture.



Soil water holding capacity

Soil water holding capacity increased by 13% in the top 10cm of the biologically-managed soil compared to conventionally-managed soil and by 9.6% compared to soil under permanent pasture. Soil water holding capacity was not measured in the 10-20cm or 20-30cm increment.

The bottom line...

Using NutriSoil® has significantly improved soil microbial activity, which has had a whole range of flow on effects for the Haggertys, including increases in:

- soil carbon stocks
- soil nitrogen stocks
- soil water holding capacity
- soil nutrient availability
- soil tilth
- friable depth
- crop and pasture productivity
- pasture plant biomass
- nutrient density of pastures
- nutrient density and omega-3 content of lamb
- grain quality

Under the Haggerty's biologically-based farming system soils retain moisture that would previously have been lost to evaporation, enabling them to grow profitable crops in years with less than half their average rainfall. Grain quality has also improved with less screenings and less frost damage. Tractor fuel consumption and wheel slip has halved due to improved soil tilth.

Increasing soil microbial activity has been the key to achieving nutrient balance – with healthy soil microbial populations nutrient problems tend to resolve themselves. Improvements in nutrient availability have increased the nutrient density of their pastures and their lamb. As soil conditions improved and hard pans disappeared, the increases in pasture plant biomass have naturally led to an increased prevalence of preferred pasture species. The Haggertys no longer use mineral fertilisers on some properties and they have also substantially reduced their herbicide use.

Flexibility and adaptability has been critical to the Haggerty's staged transition to biological farming. Introducing biologically-based products vastly improved the performance of their mineral fertilisers and they were then able to manipulate rates to make gentle changes that didn't shock the soil or their bank balance.

Using NutriSoil® as part of a biologically-based farming is helping the Haggertys build a healthier and self-sustaining farming system. They are producing healthier and higher quality grain and meat with less inputs – a win-win situation for them and consumers.



"We've had good results with biological farming on wodgil soil (brown acidic non-wetting loam with high aluminium levels) as well as deep white sands with low fertility. Even though nitrate and potassium levels are low in soil tests, tissue tests show good levels in crops."



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NutriSoil Comparisons to Conventional Fertilisers (MAP, DAP, Superphosphate/UREA)

Preliminary results have arrived from Dr Ash Martin and Dr Maria Manjarrez, and their team at Microbiology Laboratories Australia (Microbe Labs/CIAAF) and the research **PROVES** that:

NutriSoil Delivers (On wheat, compared to control):

- **Significant improvement in Overall Microbial Balance** compared with all other fertiliser treatments.
- **Increased yield** compared with MAP.
- **Comparable yield to DAP and Urea + Superphosphate.**

- **A MASSIVE 224% increase in Mycorrhizal fungi** - responsible for delivering nutrient and water to plants!
- **Results prove the suppression of Mycorrhizal Fungi and the essential soil services they perform by the other fertiliser treatments.**

It is significant to note that these results were from one season and do not take into account the cumulative/ on-going benefits of improving soil health. Economic comparisons and improved quality in yield data is also still to come.

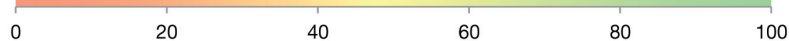
Soil microbiology

Overall microbial balance

Nutrisoil LS
5 L/ha @ sowing



MAP
50 kg/ha @ sowing



DAP
50 kg/ha @ sowing



Urea + Superphosphate
50 kg/ha (each) @ sowing



vs control

+49% * a

-16% b

+9% ab

+10% ab

Mycorrhizal fungi

Nutrisoil LS
5 L/ha @ sowing



MAP
50 kg/ha @ sowing



DAP
50 kg/ha @ sowing



Urea + Superphosphate
50 kg/ha (each) @ sowing



vs control

+224% * a

-46% b

-29% b

-19% b



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What does this mean to the farmer?

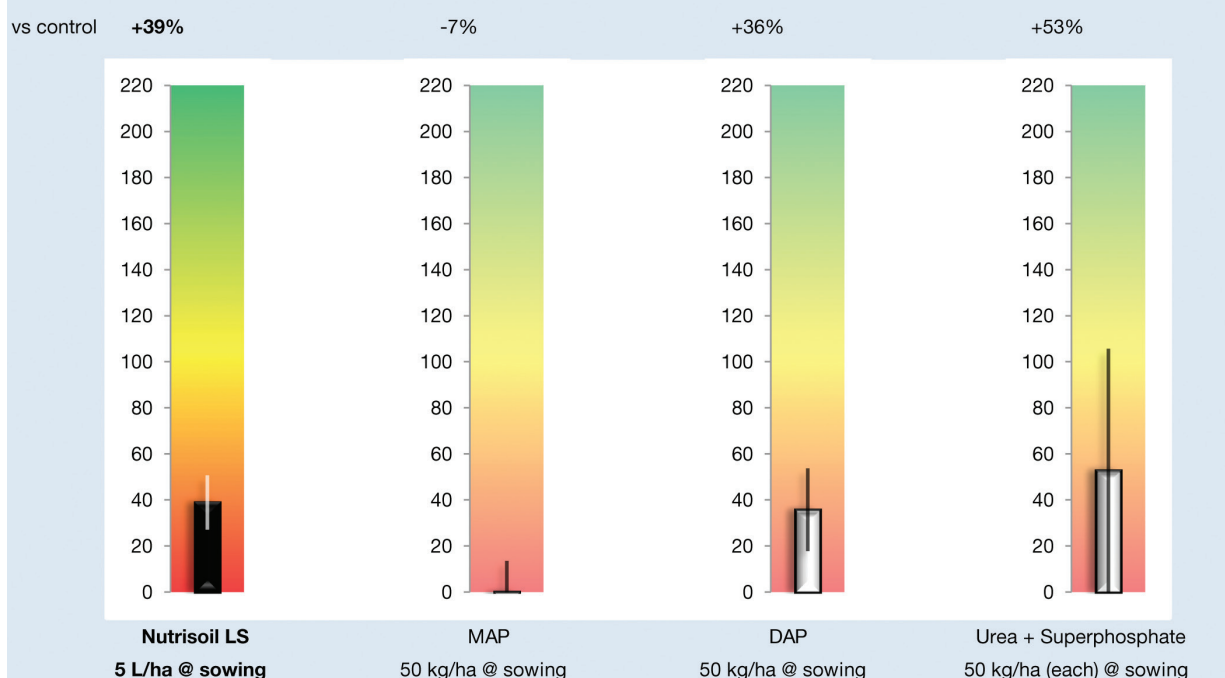
NutriSoil produces comparable production to a conventional crop, decreases costs, increases profits and increases the function and productivity of soil for future crops. Further results to these studies will be posted onto our website as results come in.

Note: Results were more profound in acid soils.

Research indicated alkaline soils may take longer for changes to occur.

Crop growth

Yield



Summary of Results

vs control	NutriSoil LS 5 L/ha @ sowing		MAP 50 kg/ha @ sowing		DAP 50 kg/ha @ sowing		Urea + Superphosphate 50 kg/ha (each) @ sowing	
Soil Microbiology	Mean (%)	Variation	Mean (%)	Variation	Mean	Variation	Mean	Variation
Indicators								
Nutrient solubilisation rate	+143	±8	-18	±15	-3	±16	+5	±14
Nutrient cycling rate	+62	±6	-19	±15	+10	±12	+15	±14
Disease resistance	+77	±5	-18	±14	+21	±11	+15	±13
Drought resistance	+127	±7	-17	±13	-3	±10	+5	±12
Nutrient accesibility (VAM)	+224	±12	-46	±34	-29	±28	-19	±24
Residue breakdown rate	+59	±4	-19	±15	+22	±12	+10	±14
Overall microbial balance	+49	±4	-16	±8	+9	±6	+10	±9



Freight is FREE in NSW/VIC
and subsidised in all other
parts of Australia.



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