JULY 2021

DEMO SITE UPDATE: RICHMOND, TASMANIA

INTRODUCTION

The Richmond demonstration site in southern Tasmania is located in the Coal Valley and hosted by Harvest Farms.

In 2018, a farm demonstration trial was established to examine the costs and benefits of quality compost as an organic soil amendment on spinach babyleaf crop yield and quality.

This update summarises the soil pathogen DNA results from 2020, or year 3 of the trial.

About the trial

In year three, a barley cover crop was grown over the winter and the following treatments were applied in October 2020:

- Compost @ 30m³/ha
- Compost @ 60m³/ha
- Nil amendments (control).

There were two replicates of each treatment. Each compost treatment plot was 18 beds x 120m length. Control plots were smaller and were 18 beds x 60m length. The total area of the trial was approximately 1.7 hectares.

Compost was applied by a contractor using a spreader on a truck.

A full summary of year 3, including other data such as soil microbial tests, soil moisture holding capacity and conventional soil test results, will be available soon from the Soil Wealth ICP project team – stay tuned!

In the meantime you can visit the Soil Wealth and Integrated Crop Protection website for more information on the approach and results from year one and year two of the trial.

KEY MESSAGES

- ✔ **A demonstration site trial at Harvest Farms in Richmond, Tasmania is exploring the impact of organic soil amendments on babyleaf crop quality and yield.**
- ✔ **This update summarises the soil pathogen DNA results from year three of the trial.**
- ✔ **More information will be available in a detailed demonstration site case study.**

This project has been funded by Hort Innovation using the vegetable, fresh potato and potato processing research and development levies and contributions from the Australian Government. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture.

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SoilWealth NURTURING CROPS

Integrated Crop Protection PROTECTING CROPS

SOIL PATHOGEN DNA RESULTS: YEAR 3

Soilborne diseases can cause significant damage and crop losses to vegetable growers. The most important, and potentially destructive, pathogens of baby leaf crops are *Pythium* spp, *Phytophthora* spp, *Fusarium* spp and *Rhizoctonia* spp.

There were no clear treatment effects on soil pathogen DNA results. Therefore, the results were combined and the average reported for the time of sampling (see table below).

Pathogens	Time of sampling		Change
	October 2020: before compost (pgDNA/g sample)[1] or (kDNA copies/g sample)[2]	January 2021: at harvest spinach crop (pgDNA/g sample) or (kDNA copies/g sample)	
Pythium Clade I (multiple species) (pgDNA/g Sample)	429	853	↑ 424
Pythium Clade F (multiple species) (pgDNA/g Sample)	102	100	
Pythium sulcatum (kDNA copies/g Sample)	0	0	
Pythium violae (kDNA copies/g Sample)	0.6	0.6	
R. solani AG2.1 (pgDNA/g Sample)	0	0	
R. solani AG2.2 (pgDNA/g Sample)	0.0	0.1	
R. solani AG3 (pgDNA/g Sample)	4	4	
R. solani AG4 (pgDNA/g Sample)	0	0	
R. solani AG8 (pgDNA/g Sample)	10	2	↓ 8
S. sclerotiorum (kDNA copies/g Sample)	0.6	0.0	

Key: Low | Low-moderate | Moderate | Moderate-high | High

1 pgDNA = picograms of DNA
2 kDNA copies = 1,000 DNA copies

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Compost is applied at the trial site in October 2020.

PYTHIUM RESULTS

- **Pythium Clade I results increased,** with higher levels detected in January 2021 than in October 2020. This means that at least one of the species included in Clade I was hosted by the crop.
- In previous research undertaken in a different block at this farm in 2017, two species of Pythium (*P. ultimum* var *ultimum* and *P. irregulare*) were detected and caused root rot symptoms in spinach plants. ***P. irregulare*** is included in Clade F and ***P. ultimum*** is included in Clade I, however we do not know if these species were included in the detections in the 2020/21 trial.
- **Pythium Clade I results are not really high, unless they can be associated with clear root damage,** which we were not able to do in this demonstration (due to limited resources and other factors affecting crop health). Healthy plants could sustain the level of Pythium in these results without showing symptoms.
- **Not all Pythium species are encompassed in the suite of tests.** Therefore, it is possible that other Pythium species that cause root disease in baby leaf crops is present at the site but was not tested here.
- **Pythium Clade I and Clade F include some species that are concerning.** We do not know which species were more prominent in those detected.

RHIZOCTONIA RESULTS

- ***R. solani* AG8** levels declined between October 2020 and January 2021.
- ***R. solani* AG3** will often have 'hot spots' (Mike Rettke, pers comm) and have not really changed in this trial between October 2020 and January 2021.

Note that not all pathogens are included in the suite of tests (for example, Fusarium was not tested).

Pythium, Rhizoctonia and Fusarium cause damping off diseases and often appear as a disease complex. High soil moisture and unbalanced soil microbiology may contribute to conducive conditions for soil borne diseases.

CONCLUSIONS ABOUT SOIL PATHOGEN DNA

There were no clear effects on pathogen DNA levels from the compost treatment. Pythium Clade I results increased across all treatments, which means that at least one species within this clade was hosted by the crop.

The other benefits of compost will be explored in the full demonstration site case study to be released later in July 2021.

The trial spinach crop at harvest in January 2021.