

**Assessment of the Mircobiometer soil biology
test for Agrovista ltd**

**David Purdy
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1. Background

There is an increased level of interest in soil health and a greater demand for more analytical approaches, in particularly for soil biology, for its assessment from farmers and advisors. This short report reviews the use of a recently developed rapid on-site soil microbial carbon testing tool called microBIOMETER using a replicated 5 year cover crop experiment.

2. Location and site

The experiment was carried out at the location of the Agrovista trials site is near Lamport in Northamptonshire about 8 miles north of Northampton in the UK. It has a longitude of 52.372234, and latitude of -0.874273. The field site history is of arable farming rotations on a slightly southerly sloping topography (Figure 1).



Figure 1. Location of the trial site near Lamport, Northamptonshire

2.1 Soil, field, and previous cropping description

The soil at the trials site has a texture class of silty clay loam with only small variations across the trials and plots. The soil is prone to slumping and “running” together due to the higher silt content. This is typical of the geographic location. The location is not historically used for cover crops and spring cereals due to the heavier soil types and suitability of winter cropping, however the increase in resistant blackgrass populations has meant that spring cropping is used as a rotation tool in its control.

3. Methodology

A randomised replicated cover crop trial in its fifth year was used for the assessment. It comprised of 32 plots of 8 treatments and four blocks/replicates (Figure 2). In the spring of 2023, each plot was sampled with 8 soil cores to 15cm and homogenised into one sample. Three microbiometer tests were conducted on each homogenised sample. In total 96+6(headland) microbiometer tests were conducted. The entire sampling and testing process took approx.20hours.

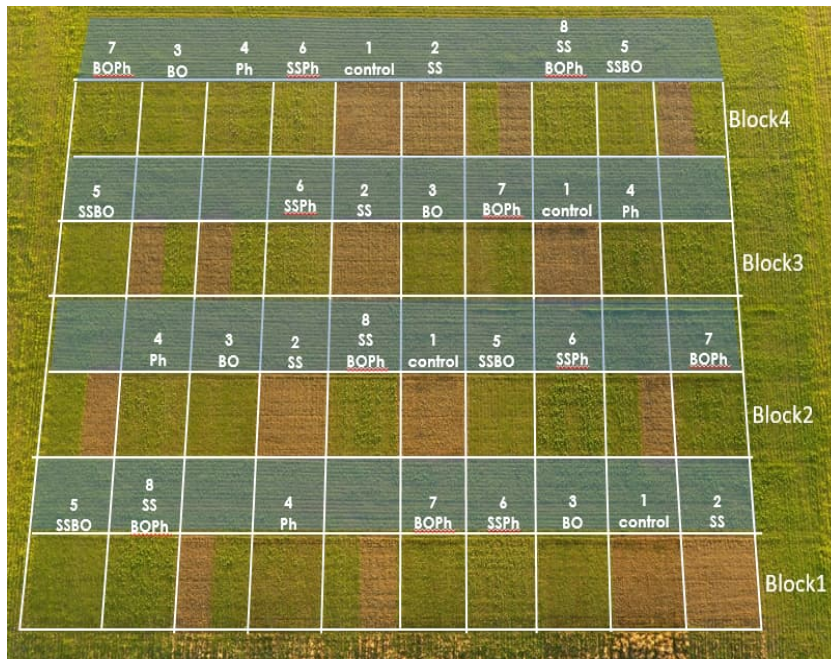


Figure 2. Layout of cover crop trial at project Lampport



Figure 3. Conducting the microbiometer tests

4. Results

Cover crops significantly increased the level of microbial carbon ($P=0.0024$) over the control treatments and the field margin significantly increased the level of microbial carbon ($P<0.001$) over all treatments (Figure 4, Table 1).

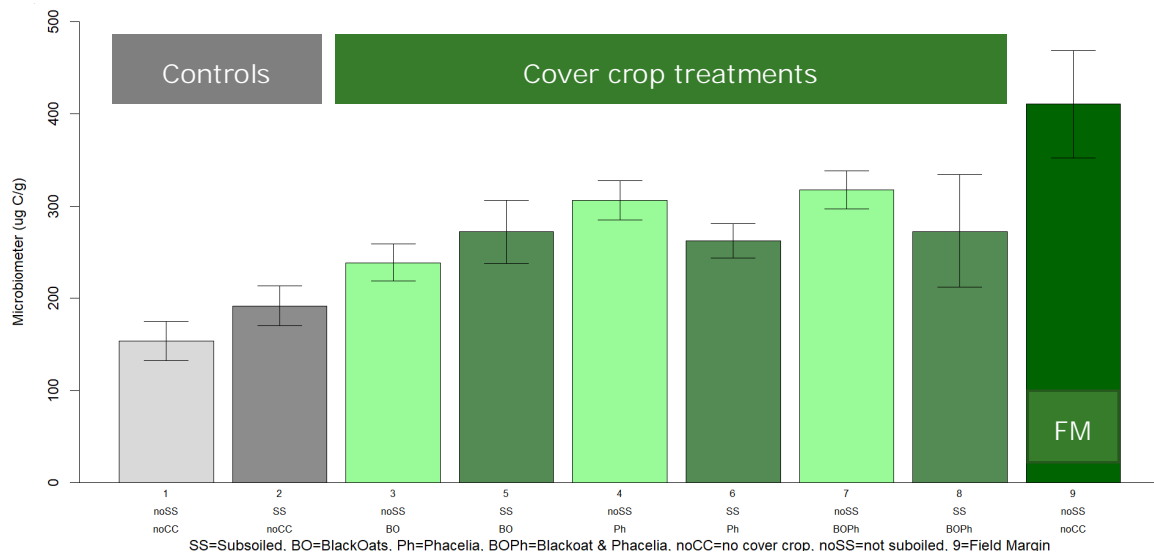


Figure 4. Microbiometer results showing the µg of microbial carbon per gram of soil. Cover crops significantly increased ($P=0.0024$) over the controls and field margin (FM) further significantly increased ($P<0.001$) over the cover crop treatments. Treatments 1 & 2 are controls, treatments 3-8 are cover crop treatments and treatment number 9 (far right) is the field margin.

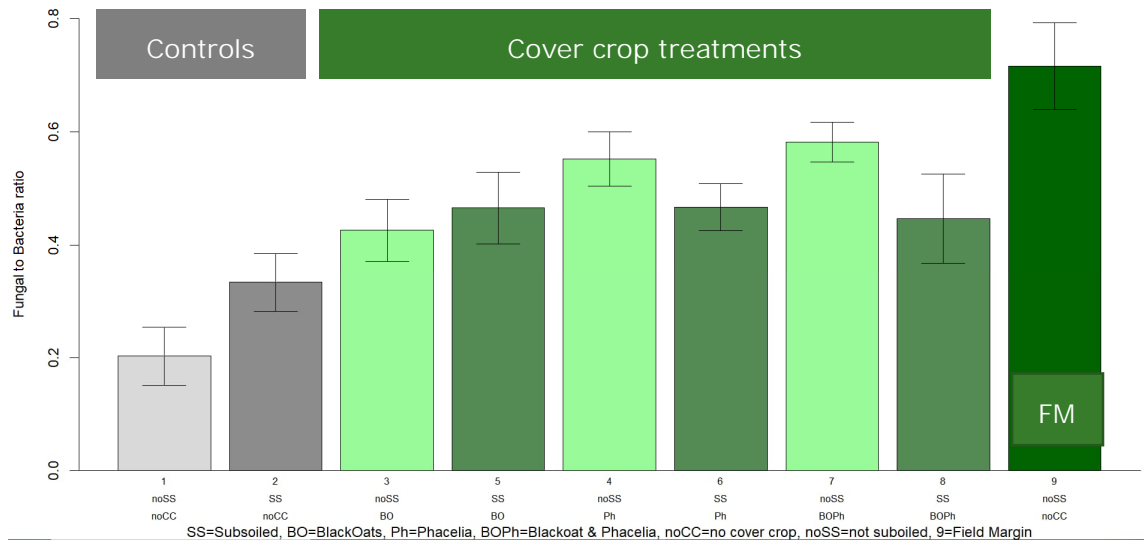


Figure 5. Mircrobiometer results showing the soil fungal to bacteria ratio. Cover crops significantly increased ($P=0.0024$) over the controls and field margin (FM) further significantly increased ($P<0.001$) over the cover crop treatments. Treatments 1 & 2 are controls, treatments 3-8 are cover crop treatments and treatment number 9 (far right) is the field margin.

Cover crops significantly increased the level of fungal to bacterial ratio ($P=0.0024$) over the control treatments and the field margin significantly increased the level of microbial carbon ($P<0.001$) over all treatments (Figure 5, Table 1). However, what the tests clearly showed that the health of the soils, even though improving under cover crops, has still some way to go biologically compared with the field margin which had a fungal to bacterial ratio 3.5 times higher than the control plots compared to the cover crop treatments which were typically 2.5 times higher than the control.

Table 1. Table of means values for each treatment.

Treatment & description	Microbial carbon per gram of soil.	F:B ratio
1) Control (no cover crop or tillage)	153.00	0.203
2) SS (no cover crop but tillage)	191.55	0.203
3) BO (low diversity cover crops no tillage)	239.08	0.334
4) Ph (High diversity cover crops no tillage)	306.83	0.427
5) SSBO (low diversity cover crops with tillage)	272.58	0.552
6) SSPh (high diversity cover crops with tillage)	262.83	0.467
7) BOPh (medium diversity cover crops no tillage)	318.17	0.581
8) SSBOPh (medium diversity cover crops with tillage)	272.91	0.447
9) FC (Field margin)	410.50	0.716

5. Summary and conclusion

These two results (Figures 3 and 4, Table 1) correlate other biological assessments and findings including recently carried worms counts. To substantiate these further comparisons will be made to Phosphor lipid fatty acid (PLFA), soil respiration (Solvita) and Chloroform Fumigation-Extraction (CFE) Microbial Biomass in the coming weeks as these tests are carried to see what relationship there might be with the Microbiometer work here. The tests, although time consuming, provided an “in field” test that when conducted well seems to suggest it is a reliable, consistent, replicable, and relatively simple test to evaluate soil biological activity.