

P2007349: Assessment and analysis at AHDB Strategic Cereal Farms

Strategic Cereal Farm West: Work package 8 – Organic matter

8.1 Trial background

AHDB [research](#) has shown the value of applying organic materials for increasing soil organic matter (SOM) contents. On light textured soils, the addition of organic materials, particularly bulk materials such as farmyard manure (FYM) and green compost have been shown to also provide valuable nutrients such as P and K. Measures of topsoil bulk density (at 5-10 cm) depth also indicated that the application of bulk organic materials reduced the level of topsoil compaction. It is known that organic matter adds to soil fertility and overall soil health by enhancing the physical, chemical and biological properties of soil. Applications of organic matter amendments, for example cattle farmyard manure, cattle slurry, green compost, food compost or food-based digestate, are often used in arable systems to provide a “food source” for the soil biological community.

The Strategic Cereal Farm West organic matter trial was established to test the extent to which organic matter amendments can be used to increase soil organic carbon, improve soil health and reduce soil compaction both in the soil surface layers (5-10 cm), as found in previous studies, but also at depth in the soil. This trial will be established in autumn 2020.

Trial aim: To determine the impact of amendments on organic matter throughout the soil profile.

8.2 Trial design – replicated tramline trial

- Field number: 25
- Field size (hectares): 12
- Harvest 2020 crop: beans
- Harvest 2021 crop: spring cereal
- Number of treatments: 3
- Number of replications: 3
- Total number of plots: 9

In 2018, comprehensive soil assessments were completed across the farm. Three major soil zones were identified in Field 25 (Figure 8.1) according to the farm soil maps. A soil health scorecard was completed for each of these zones, shown in Table 8.1.

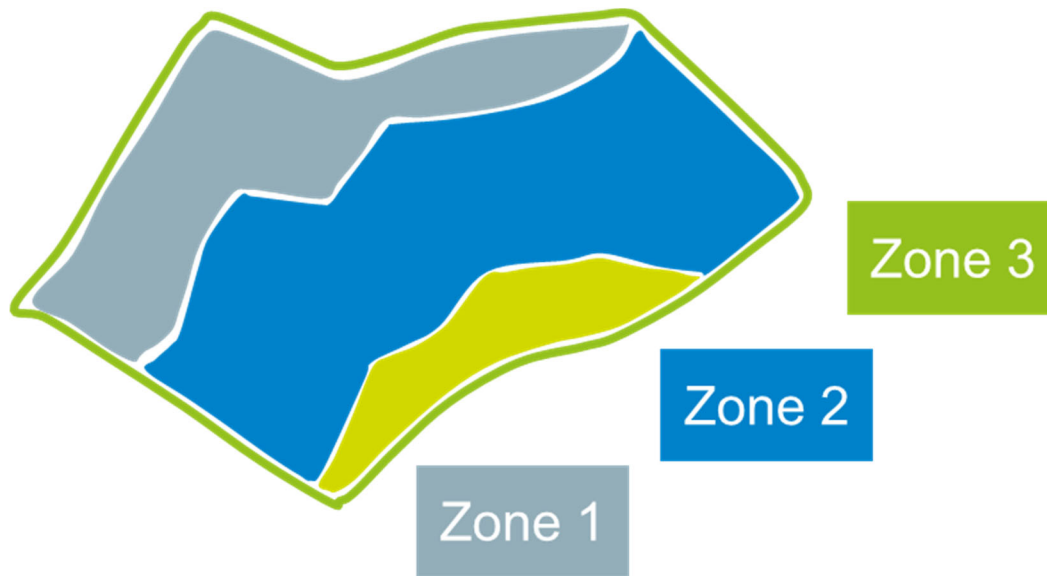


Figure 8.1 Soil type in Field 25 Organic matter trial at Strategic Cereal Farm West

Table 8.1 Results from the soil health scorecard completed on Field 25 in 2018

Zone	1	2	3
Texture	clay	clay	clay
% clay	37	43	51
SOM (%LOI)	5.0	4.7	4.4
pH	7.5	8.1	8.1
Ext. P (mg/l)	18	13	21
Ext. K (mg/l)	344	375	433
Ext. Mg (mg/l)	849	708	675
VESS score (limiting layer)	3	3	3
Bulk density (g/cm ³)	1.17	1.26	1.28
Earthworms (total number)	6	1	2
PMN (mg/kg)	98	112	88
Respiration (mg CO ₂ -C/kg)	215	169	166

The trial layout provided in Figure 8.2 is provided as a guide does not represent the exact location or dimensions of the trial.

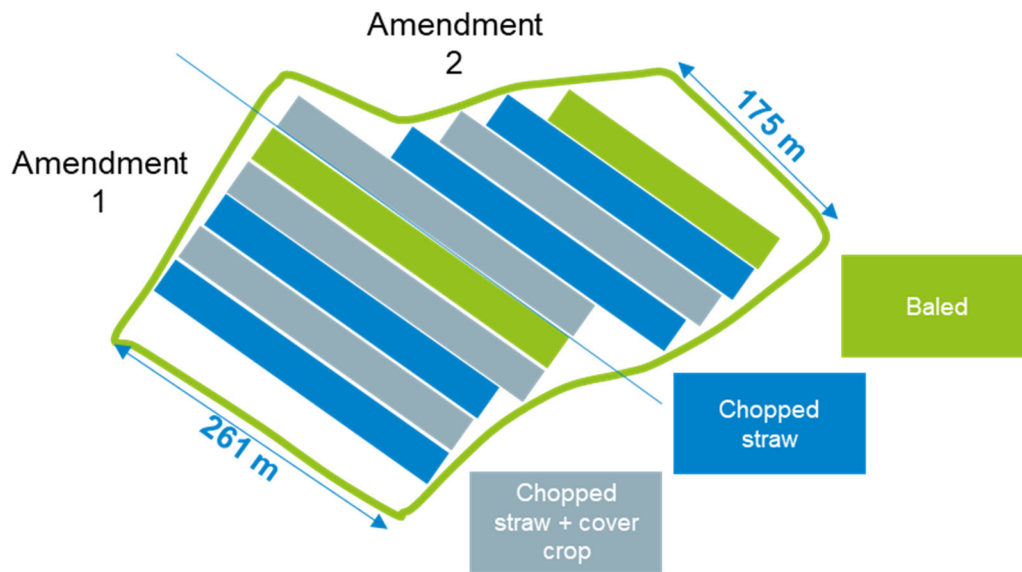


Figure 8.2 Organic matter trial layout at Strategic Cereal Farm West

8.3 Assessments

Soil sampling should be designed in a way to assess the impact of amendments in the soil surface layers but also at depth.

- Soil health scorecard:
 - Soil texture
 - SOM (%LOI)
 - pH
 - Extractable P, K and Mg
 - VESS score (limiting layer)
 - Bulk density
 - Earthworms
 - PMN
 - Respiration
- Sub-VESS
- Evaluation of treatments on soil carbon stocks/ carbon sequestration/mitigation
- Crop assessments:
 - Cover crop establishment – using hand held crop scanning equipment, at 3-5 weeks, 5-6 weeks and 7-8 weeks after drilling to give the Normalised Difference Vegetation Index (NDVI)
 - Spring crop (2019) establishment – Crop establishment: plant counts, growth stage, NDVI every two weeks for 6 weeks following emergence if treatments are likely to affect emergence or early establishment
 - Spring crop yield mapping analysis