P2108375: Assessment and analysis at AHDB Strategic Cereal Farm South

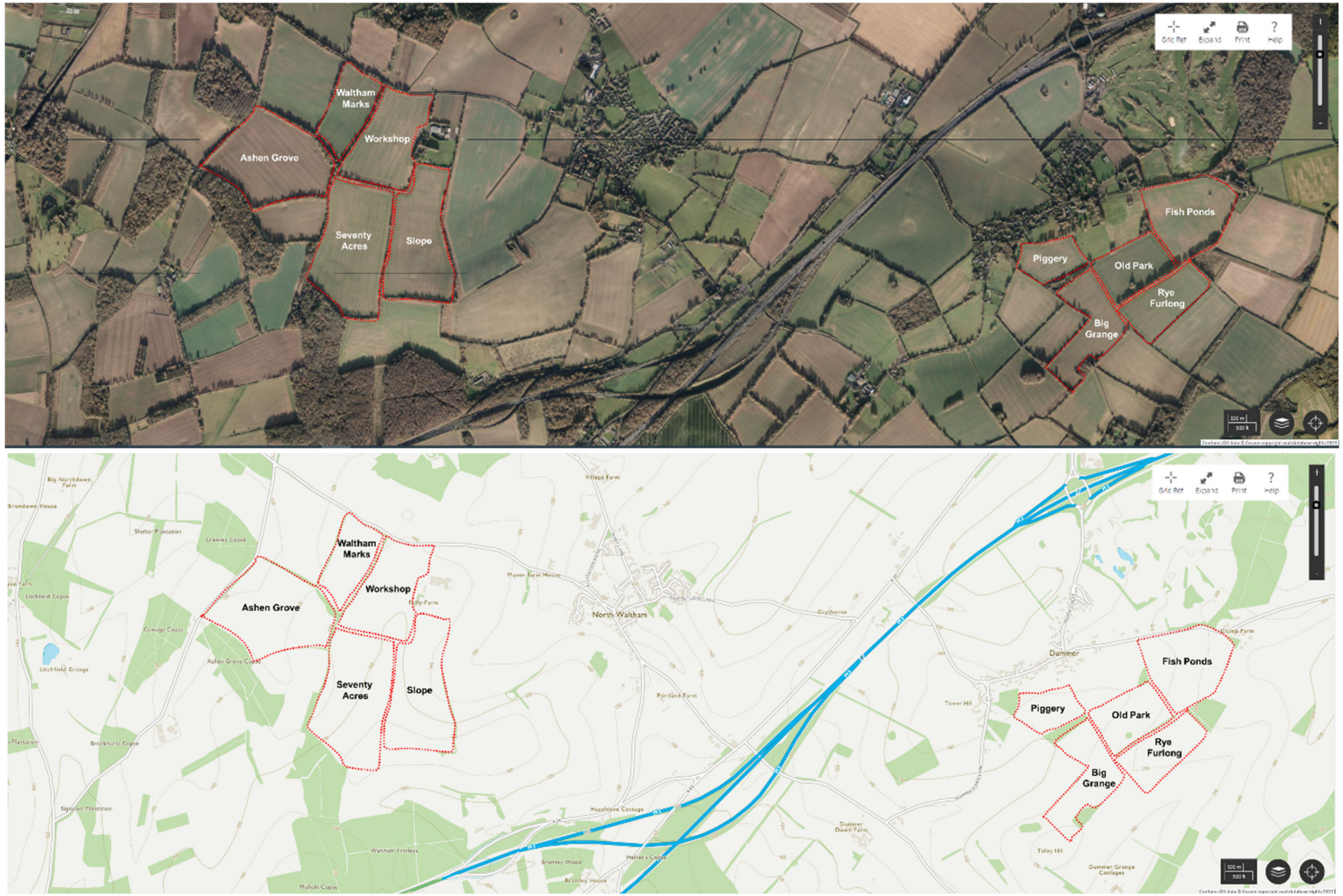
Detailed information on the assessments required within each of the trials

Site map

11 fields have been selected at the Strategic Cereal Farm South. The table below provides field details and the corresponding work package and assessments for each field.

Field name	Grid Reference	Area (ha)	Harvest 2021 crop	Harvest 2022 crop	Work package
Ashen Grove	54272 46215	24.76	2-year legume/ oilseed rape	Beans/ Winter wheat	4
Waltham Marks	54718 46555	40.64	Spring wheat	Winter wheat	4
Workshop	54942 46384	17.23	Spring wheat	2nd winter wheat	1
Seventy Acres	54733 45766	26.45	Spring barley	Rye	2
Slope	55104 45782	23.7	Rye	Spring wheat	1
Fish Ponds	59499 45965	17.97	Oilseed rape	Winter wheat	3
Old Park	59216 45670	10.43	Cover crop	Spring barley	2
Rye Furlong	59389 45489	11.05	Cover crop	Spring barley	2
Piggery	58733 45705	7.09	Beans	Winter wheat	4
Big Grange	59003 45282	12.96	Beans	Winter wheat	4
Typhrees	(TBC)	19	Spring barley	Spring barley	2

Field boundaries



Trials descriptions

The trial descriptions for each of the work packages below are provided as a guide. Where appropriate, please include alternatives to the proposed trial design and assessments in your application based on your experience. Alternative trial designs and assessments should consider the intended aim of the Strategic Cereal Farm, budget and logistics of establishing and managing trials with farm scale machinery.

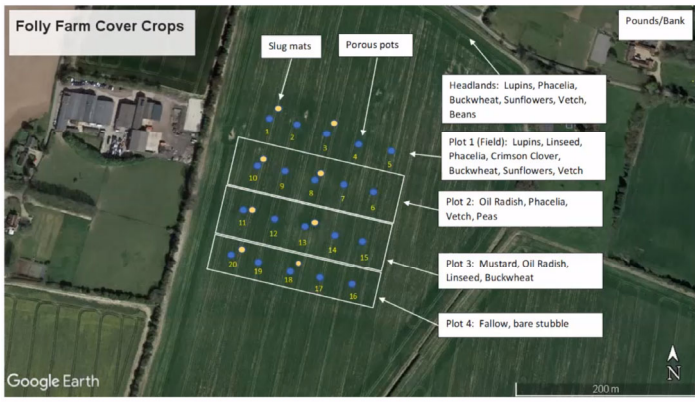
1. Work package 1: cover crops and water quality

1.1. Background

David has been using cover crops for over 10 years, first starting in 2010. Since 2015, he has been cover cropping all of the spring crop ground so everything has a crop in for the whole year. He is finding more and more reasons for growing them. At first, it was all about soil quality. The soil type on the farm is fairly light loam over chalk with a lot of flints, with clay caps on the tops of the hills. David has been 100% no-till since 2015. Secondly, he is interested in the role of cover crops to capture nutrients. Now, he is also interested in creating habitat for beneficial insects such as harvestman spiders, carabid beetles, and rove beetles.

South East Water are looking at different ways to try and help farmers and promote ways of reducing nitrate losses. Since 1997, there has been a general increase in nitrate concentrations measured in the Woodgarston catchment. In some locations, the levels of nitrate concentration have exceeded the drinking water standard of 50 mg/l NO3. Modelling of land use surveys show farms are the largest contributor in the catchment.

David has been working with South East Water, FWAG South East and Kings Crops to trial using cover crops to reduce diffuse pollution from agriculture, specifically reducing the amount of nitrates lost to groundwater in the Woodgarston catchment. The half hectare plots have 5 porous pots (sampled every two weeks or if there is 25mm of rain in this period) and 2 slug mats.



Measurements on the plots to date have included:

- SMN in the autumn – Hilcourt Farm (FWAG SE).
    - Nitrate N (kg/ha), ammonium N (kg/ha), total N (kg/ha)

- P, K, Mg, pH, OM% (autumn) (Tim does this as a field assessment – do this on a field scale not a plot scale).
- Above-ground biomass from 1m^2 in the spring
    - Fresh weight, dry matter, N%, C%, C:N ratio
- SMN in the spring
    - Nitrate N (kg/ha), ammonium N (kg/ha), total N (kg/ha)
- Slug numbers – on a plot scale
- Porous pots: 3 sets on cover crops and 1 set on a stubble control
- Insect pitfall traps – is 0.5 hectares too small to use pitfall traps. Cover crops, stubble, and winter wheat field.

1.2. Trial description

The trial description provided below is intended as a guide. The final trial design will be discussed with the successful contractor at the inception meeting.

The cover crop plots (0.5 hectares each) will be in Slope field:

- 3 cover crop plots (2 seed mixes, 1 David's mix of beans, lupins, vetch, clovers, phacelia and buckwheat
- 1 stubble control

The assessments completed in Slope field will also be completed in Workshop so that we can make a comparison between a cover crop and non-cover crop in the rotation.

1.3. Assessments

Proposals should include assessment of the cover crop plots and assessment of Workshop. In Workshop, proposals should use a field scale sampling strategy.

Soil

Whilst some measurements of soil health will be completed on the cover crop plots by FWAG/ South East Water, AHDB would like to commission additional measurements on the cover crop plots that provide more detail about the soil health.

Proposals should include detailed measurements of soil biology, soil structure and soil health that complement the existing assessments (see list above).

Measurements should be geolocated to allow repeat measurements in future years.

Proposals should consider the use of the Soil Biology and Soil Health Partnership scorecard to interpret results.

Crop

The group are interested to monitor crops to indicate plant health. The question that the group would like to answer is whether soil health improves crop health, and if in turn this

results in plants that do not suffer from pest, weed and disease attacks (see pests, weeds & disease assessments below).

To monitor crop health, the farm would like to compare different tools. David will use an N sensor to measure the crops light reflectance at specific wavebands related to the crop's chlorophyll content and biomass. By monitoring the crop in this way, the farm would like to understand whether the variability in the canopy is related to underlying soil health conditions. If it is, can the crop assessments be a proxy that the farm can use to target sampling/monitoring and analysis to help understand what is driving those variations and why.

Proposals should include assessments that can be used to determine plant health, and could include growth stage, GAI, tissue analysis.

Pests, weeds & disease

The farm would like to do the crop assessments (growth stage, GAI, tissue analysis) alongside insect, disease and weed monitoring. This will help determine plant-insect interactions and provide information on predatory insect control.

Multi-year water quality data analysis

Proposals should include an element of data analysis, from the current trial but also the previous trials conducted by David. Data will be provided to the successful contractor at the inception meeting.

2. Work package 2: soil and crop health under different management systems

2.1. Background

The goal of the Strategic Cereal Farm South is to maximise carbon sequestration and biodiversity and reduce nitrogen and other inputs. In practice, this means designing rotations and management systems that include grassland, grass leys, cover crops and arable crops. This year, David is taking on an area of land that he hasn't managed before. The farm has managed their own fields with a regenerative mind-set for many years. This provides an opportunity for us to monitor the soil and crops across the rotation in these fields and compare agronomic and financial performance. During the 6-year programme, the farm also want to look at the nutrition in the crop they produce. It is believed that regenerative farming results in more nutritious food. As such, there is an opportunity to measure the difference in nutrient density of the end product from the fields managed with a different approach.

2.2. Trial design

One of the two fields coming under David's management is called Typhrees. It has been managed using conventional cultivation for 5 years of conventional cultivation. In autumn 2021 it will go into a cover crop, followed by a spring barley crop for harvest 2022.

This field will be monitoring and compared to Rye Furlong and Old Park. Both of these fields have been managed by David for 7 years, and will also both be going into a cover crop in autumn 2021, followed by a spring barley crop for harvest 2022.

Additionally, soil health and crop health measurements will be completed in Seventy Acres. This field is currently in spring barley for harvest 2021 and will go into rye for harvest 2022.

2.3. Assessments

Soil

Proposals should include detailed measurements of soil biology, soil structure and soil health. Measurements should be geolocated to allow repeat measurements in future years. Proposals should consider the use of the Soil Biology and Soil Health Partnership scorecard to interpret results.

Crop

The group are interested to monitor crops to indicate plant health. The question that the group would like to answer is whether soil health improves crop health, and if in turn this results in plants that do not suffer from pest, weed and disease attacks (see pests, weeds & disease assessments below).

To monitor crop health, the farm would like to compare different tools. David will use an N sensor to measure the crops light reflectance at specific wavebands related to the crop's chlorophyll content and biomass. By monitoring the crop in this way, the farm would like to understand whether the variability in the canopy is related to underlying soil health conditions. If it is, can the crop assessments be a proxy that the farm can use to target sampling/monitoring and analysis to help understand what is driving those variations and why.

Proposals should include assessments that can be used to determine plant health, and could include growth stage, GAI, tissue analysis.

Food nutrition value

Farmers can have their grain analysed for a range of nutrients. But a topic that the Strategic Farm is interested in is the nutritional value of the crop produced itself. It has been claimed that regenerative agriculture could increase the nutritional quality of our food. Studies have been done in horticulture crops and the farm are interested in finding out more about the role of soil and crop health in cereal crops. Proposals should therefore include assessments to help understand the nutritional quality of the crops.

3. Work package 3: soil health at crop establishment

3.1. Background

For autumn 2021, the farm will host a trial using a variety of approaches to enhance the soil plant interaction at drilling. This will include different treatments placed with the seed and will measure the impact on early crop growth, both above and below the ground.

3.2. Trial design

This trial will take place in Fish Ponds in a crop of winter wheat. All treatments will be applied at drilling.

1) Untreated control
2) L-CBF BOOST™
3) Ecoworm

3.3. Assessments

Roots

Ensuring that crops have well developed root systems is essential for optimum water and nutrient capture. Proposals should include measurements of rooting characteristics including root length density, root mass and the interaction between the root systems and the soil.

Soil

Proposals should include detailed measurements of soil biology, soil structure and soil health. Measurements should be geolocated to allow repeat measurements in future years. Proposals should consider the use of the Soil Biology and Soil Health Partnership scorecard to interpret results.

Crop

The focus for this trial is on early crop growth and proposals should therefore include measurements to characterise this.

4. Work package 4: soil health field assessments

4.1. Background

The group want to know more about how the soil functions. A key area to find out more about is benchmarks for healthy soils, especially the ratio between carbon and nitrogen.

4.2. Trial design

- Ashen Grove

- Waltham Marks
- Piggery
- Big Grange

4.3. Assessments

Soil

Proposals should include detailed measurements of soil biology, soil structure and soil health. Measurements should be geolocated to allow repeat measurements in future years. Proposals should consider the use of the Soil Biology and Soil Health Partnership scorecard to interpret results.