P2007349: Assessment and analysis at AHDB Strategic Cereal Farms

Strategic Cereal Farm West: Work package 5 - Managed lower inputs

5.1 Trial background

Disease management in cereal crops is a challenge, especially with the withdrawal of active ingredients and the development of fungicide resistance. New products and active ingredients continue to be introduced by the plant protection industry, but the frequency of these is diminishing. Through the fungicide performance programme, AHDB funds research to provide farmers and agronomists with independent information on the efficacy of established and new fungicide active ingredients and products. Another tool that is extremely valuable to the arable industry is the Recommended Lists (RL). The RL provides information that helps farmers and agronomists to select the most appropriate varieties to grow on their farm, based on on yield and quality performance, agronomic features and market options.

The fungicide performance research and RL provides a robust evidence base for disease management and variety performance from a series of replicated plot trials. This information is valuable to growers but the opportunity with the Strategic Cereal Farm is to see how the outcomes of this research can be integrated into a commercial farming system. The Strategic Cereal Farm West trial was established to test the extent to which the outcomes found in the research trials are also seen in a commercial farm system, specifically the cost benefit of different agronomy programmes and the role of genetic potential of varieties for disease management on-farm.

For harvest 2019, the Strategic Cereal Farm West investigated the impact of fungicide inputs on winter wheat variety Graham. A split field trial design was used, with two treatments. One treatment, referred to as a farm standard, which used dressed seed and received a conventional programme. The second treatment was a reduced input programme, which used untreated seed. The trial results, which are available online, showed that there was no significant difference in yield between treatments.

This trial will be repeated for harvest 2021 as detailed below.

Trial aim: To determine the effect of reduced fungicide applications on varieties with different disease ratings for disease control under farm standard, low, biorational and untreated agronomy strategies.

5.2 Trial design – replicated tramline trial

- Field number: 13
- Field size (hectares): 17.77
- Harvest 2021 crop: winter wheat
- Total number of plots: 20

In 2018, comprehensive soil assessments were completed across the farm. Two major soil types were identified in Field 13 (Figure 5.1) according to the farm soil maps: 'heavy red' (zone 1) and 'medium/heavy loam' (zone 2). A soil health scorecard was completed for each of these zones, shown in Table 5.1. Shallow (0-40 cm) and deep (0-120 cm) electrical conductivity maps of the field are provided in Figure 5.2.

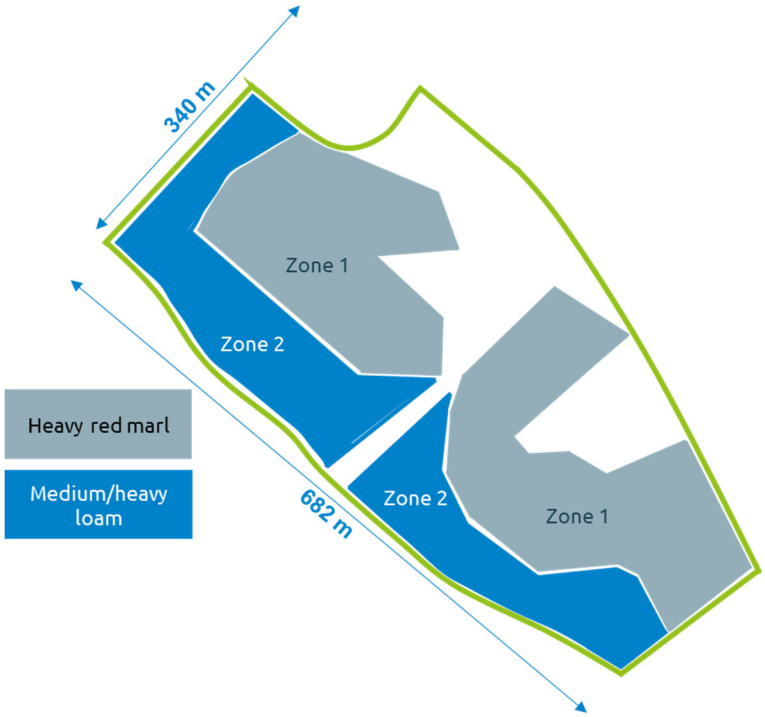

Figure 5.1 Field 13 soil map

Table 5.1 Results from the soil health scorecard completed on Field 13 in 2018

Zone	1	2
Texture	Clay	Clay
% clay	57	38
SOM (%LOI)	5.6	4.4
pH	7.3	6.8
Ext. P (mg/l)	18	23
Ext. K (mg/l)	408	254
Ext. Mg (mg/l)	1234	943
VESS score (limiting layer)	3	3
Bulk density (g/cm^3)	1.27	1.27
Earthworms (total number)	10	9
PMN (mg/kg)	78	39
Respiration (mg CO_2-C/kg)	149	141

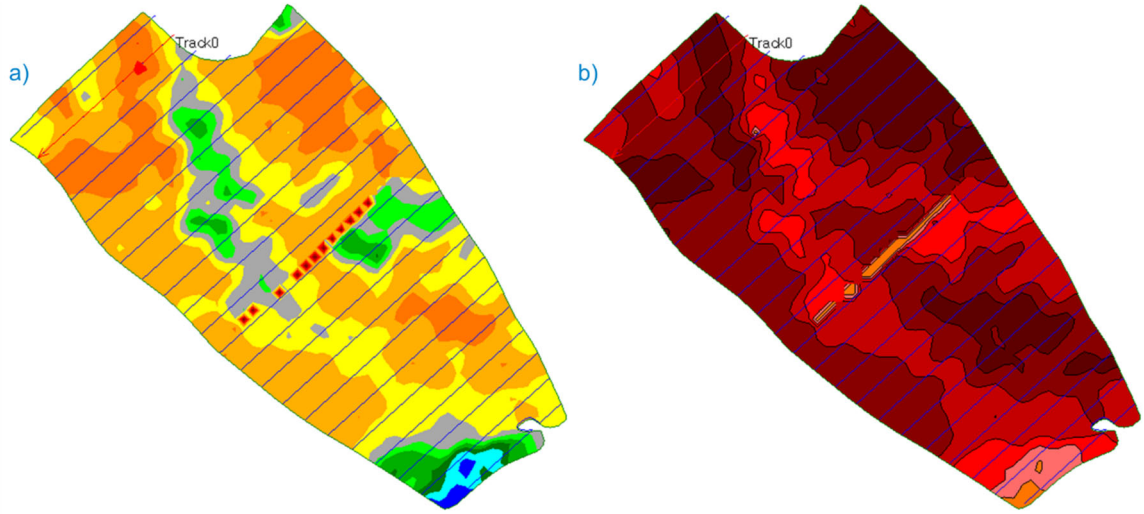

Figure 5.2 a) Shallow (0-40 cm) and b) deep (0-120 cm) electrical conductivity of field 13 at Strategic Cereal Farm West

The proposed trial layout (Figure 5.3) has been designed to provide robust data and minimise the influence of background soil variation. The design takes account of the underlying variation within the field and aims to be achievable to implement, whilst maximising the strength of disease and yield comparisons. The design focuses on the comparison of the input treatments within each variety, whilst minimising the area of untreated so that it provides a reference whilst preventing significant yield loss.

Proposals should consider the trial design and propose alternatives to the trial design if appropriate to improve the power of statistical analysis. The field maps are provided as a guide and do not represent exact locations or dimensions.

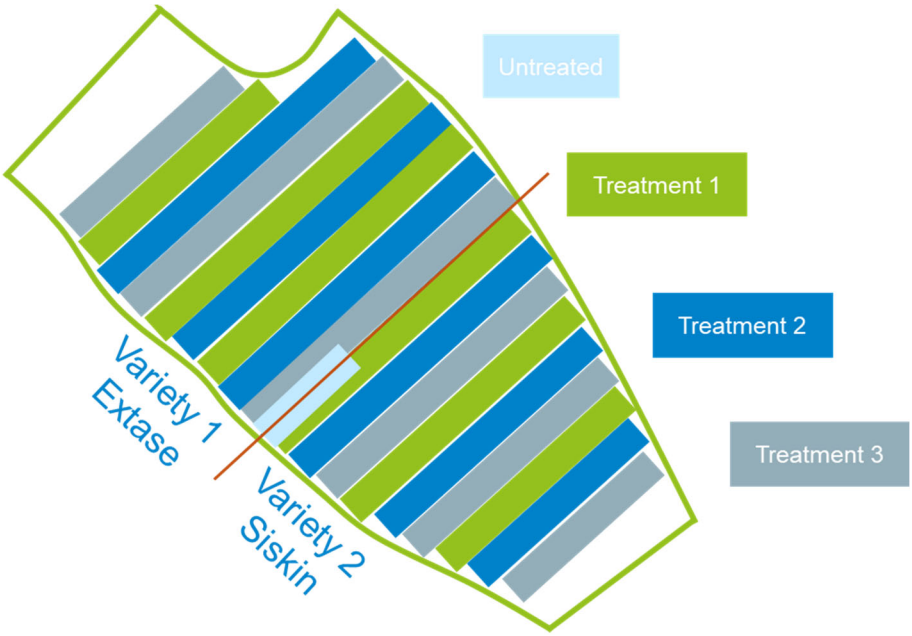

Figure 5.3 Managed lower input trial layout at Strategic Cereal Farm West

Treatments are yet to be finalised but are likely to be:

- Untreated
- Treatment 1 – farm standard
- Treatment 2 – low
- Treatment 3 – biorational

5.3 Assessments

Growth stage, NDVI and GAI should be assessed at the following growth stages:

- Crop emergence (GS10)
- Start of stem extension (GS30, T0)
- Stem extension (GS31-33, T1)
- Flag leaf emerged (GS39, T2)
- Flowering (GS61-65, T3)
- Milk development (GS71)
- Harvest

Combine yield data will be collected by Rob Fox and the successful contractor should analyse this data.

Disease assessments should be completed at the relevant timings shown in Table 5.2.

Table 5.2 Disease assessments and timings for Managed Lower Inputs trial at Strategic Cereal Farm West

At or slightly before GS 31	Record foliar disease if moderate infections (around 5%) occur in any plot.
GS 31-55	An assessment of foliar disease is required if moderate infections (around 5% in untreated plots or 2% in treated plots) develop in any plot. Once infection reaches 5% assessments should be done at least every two weeks, depending on crop and disease progression. Stem disease should be assessed.
GS 55-80	Assess all foliar diseases that reach 5% infection in any one plot during this period. Once 5% is reached, aim to assess the trial every two weeks, or frequently enough so that meaningful disease scores can be obtained i.e. the progression of the disease from one assessment to another can be tracked. This may mean visiting the trial more than every 2 weeks, or less than every 2 weeks. It may be appropriate to assess different diseases at different stages within this period (e.g. mildew might be better assessed relatively early and brown rust late). Stem and ear diseases should be assessed.

When assessing diseases, also record the percentage green leaf area (GREEN LEAF AREA%) remaining on the leaves being assessed. If disease levels are too low for an assessment, please record this in the trial diary.

The successful contractor will be required to provide monthly trials diaries to AHDB. During the period of disease assessment, the successful contractor will be required to provide trials diaries following each assessment.