

P2007349: Assessment and analysis at AHDB Strategic Cereal Farms

Strategic Cereal Farm Scotland: Work package 14 – Crop nutrition trial

14.1 Background

AHDB has an extensive nutrient management research programme for arable crops, comprising work to improve and optimise nutrient applications that are both environmentally and economically sustainable.

Timing nutrient applications correctly is as important as applying the right amount. Crop demand varies throughout the season and is greatest when a crop is growing quickly, therefore results from laboratory tissue testing may be quickly outdated. Rapid development of leaves and roots during the early stages of plant growth is crucial to reach the optimum yield at harvest, and an adequate supply of all nutrients must be available during this time.

Excess application of nutrients, or application at the wrong time, can reduce crop quality and cause problems such as lodging of cereals or increases in foliar pathogens.

[Research Review 93](#) reported that crop material testing as well as soil analysis may provide guidance on nutrient use and thus help direct crop nutrient management.

Aim: To determine whether amending crop nutrition in response to live tissue testing will have an economic benefit on crop health.

14.2 Trial design – replicated tramline trial

- Field name: 11. Tank Wilsons March
- Field size: 13.5 ha
- Soil type: Sandy silt loam
- Harvest 2021 crop: Winter wheat
- Number of treatments: 3 (untreated, farm standard, real-time nutrient adjusted)
- Number of replications: 3
- Total number of plots: 9

14.3 Assessments:

The following assessments should be carried out:

- Crop emergence (GS10) – plant counts
- Start of stem extension (GS30, T0) – plant and tiller counts
- Stem extension (GS31-33, T1) – tiller counts
- Flag leaf emerged (GS39, T2) – tiller counts
- Flowering (GS61-65, T3) – tiller and ear counts
- Milk development (GS71) – ear counts
- Harvest – yield and grains per ear

At each timing, the following assessments should be completed:

- Growth stage
- NDVI
- GAI
- Above-ground fresh and dry biomass
- Tissue sampled for full nutrient analysis (WP3)
- Brix meter (WP3)
- Plant pH
- Sap nutrient assessments

The following disease assessments should be completed at the following timings:

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.
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).

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. The Strategic Cereal Farm Scotland would like to understand the effect of real-time nutrient amendments on crop health. During the period of disease assessment, the successful contractor will be required to provide trials diaries following each assessment.