

P2007349: Assessment and analysis at AHDB Strategic Cereal Farms

Strategic Cereal Farm Scotland: Work package 13 – Plant Health

Background

A long-term aim of the Strategic Cereal Farm Scotland is to reduce reliance on artificial inputs.

AHDB already plays a key role in fungicide anti-resistance through monitoring and research of key diseases to develop the most effective anti-resistance strategies, reducing reliance on fungicides. The AHDB Recommended Lists have raised minimum standards for variety disease resistance which potentially enables the reduced use of, and thus pressure on, fungicides.

The Strategic Cereal Farm Scotland would like to baseline plant health at the start of the programme, through disease assessments and brix metre readings.

Aim: To baseline crop health to see how management practices affect overall crop health.

Design

Field sites and treatments

8 fields totalling 110 hectares

Field number	Area (hectares)	2019 harvest crop	2020 harvest crop	2021 harvest crop	Zone	Variety
1. Castle Park	14	Spring Oats	Spring Barley	OSR	A	Laureate
4. Front Bandon	6	Cauliflower	Spring Oats	Winter Wheat	A	Conway
5. Horse Park	9	Winter Oats	Spring Barley	Spring Barley	A	Laureate
7. Bottom Boiler Well & Bottom Strip	11.5	Winter Wheat	Cauliflower	Winter Wheat or Winter Oats	B	
9. East Myres	24	Spring Beans	Spring Oats	Spring Barley	B	Conway
11. Tank Wilsons March	13.5	Summer cover crop after carrots	Winter Oats	Winter Wheat	B	
12. East Bank Treaton	20	Winter Wheat	Kale/Summer cover crop	Spring Oats	B	
13. Castle Heggie	12	Cabbages	Spring Barley	Spring Oats	B	Laureate

13.3 Assessments

Proposals should include a time schedule and protocol (including number of samples and analysis) for the following assessments in accordance with standard operating procedures and to address the aim of the project.

Ideally one person should conduct all the disease assessments on each assessment date. Where additional staff are required on a given assessment date, assistance is best employed in sampling and recording with one person carrying out all the actual disease assessments.

Careful observations and quantitative records should be made of disorders, pests or other effects when they are detected.

In addition to the sampling protocol below, brix meter testing should be carried out.

Winter wheat

- Plant/tiller/ear counts to be completed at the key growth stages through the season, using the timings of the key benchmark growth stages in the [AHDB Wheat growth guide](#) (page 8), eg. crop emergence (GS10), the start of stem extension (GS31), flowering (GS61), the end of grain filling (GS87) and at harvest
- Record of growth stage on each assessment date
- Plants to be cut and wet weight measured for biomass at each of these key growth stages, as relevant
- Samples to be sent for tissue analysis and dry matter testing at each of the key growth stages, as relevant
- Normalised Difference Vegetation Index (NDVI)

Spring barley

- Plant/tiller/ear counts to be completed at the key growth stages through the season, using the timings of the key benchmark growth stages in the [AHDB barley growth guide](#) (page 8), e.g. GS21, GS31, GS39, GS59, GS71 and GS87 and at harvest
- Record of growth stage on each assessment date
- Plants to be cut and wet weight measured for biomass at each of these key growth stages, as relevant
- Samples to be sent for tissue analysis and dry matter testing at each of the key growth stages, as relevant
- Normalised Difference Vegetation Index (NDVI)

Oats

- Plant/tiller/ear counts to be completed at the key growth stages through the season
- Record of growth stage on each assessment date
- Plants to be cut and wet weight measured for biomass at each of these key growth stages, as relevant
- Samples to be sent for tissue analysis and dry matter testing at each of the key growth stages, as relevant
- Normalised Difference Vegetation Index (NDVI)

Cereal diseases and green leaf area

All cereal varieties will be assessed for disease and GLA at:

- T0 timing, to determine over winter disease pressure
- T1 = Leaf 3 emerged (GS32) on the majority of shoots.
- T2 = Flag leaf emergence (GS37-39)
- T2 + three weeks (=T1 + six weeks)
- T2 + six weeks

For each assessment timing assess 40 plants at random across each plot and record (separately) the mean % leaf area affected by each foliar disease present for each leaf layer excluding senesced leaf layers.

Ear diseases

Assess diseases on 100 ears per plot at GS85.

Stem base disease

Record stem base diseases on 25 stems at random across the plot at GS31-32 before any treatment. Record on a stem by stem basis the presence or absence of individual diseases and, for eyespot, the severity expressed as the number of leaf sheaths penetrated (i.e. showing brown staining).

At GS75, score the number of stems that fall into slight moderate or severe categories on 25 stems per plot.

Oilseed rape

- Plant counts to be completed at the key growth stages through the season
- Record of growth stage on each assessment date
- Plants to be cut and wet weight measured for biomass at each of these key growth stages, as relevant
- Samples to be sent for tissue analysis and dry matter testing at each of the key growth stages, as relevant
- Normalised Difference Vegetation Index (NDVI)

The following gives a guide to the timing of disease assessments for oilseed rape.

	Leaf production	Early stem extension	Yellow bud stage	Late flower	Prior to pod ripening	Swathing
Light leaf spot % on leaves	✓	✓	✓	✓		
Light leaf spot % on pods					✓	
Downy mildew %	✓	✓	✓			
Stem canker disease index					✓	✓
Phoma leaf spot %	✓	✓				
Alternaria % on leaves			✓	✓		
Alternaria % on pods					✓	
White leaf spot %	✓	✓		✓		

Sclerotinia %				✓	✓	
Botrytis %				✓	✓	
Powdery mildew %			✓	✓	✓	
Verticillium %						✓