

Strategic Cereal Farm West

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Open Day 5 June 2019

Strategic Cereal Farm project

Strategic Cereal Farms test the outputs of research on-farm.

- 6 year programme
- Farmer-to-farmer learning
- Share knowledge
- Explore best practice
- Economic analysis of each trial



Programme

12:30 Registration and lunch

- 12:50Welcome and introductionsRob Fox, Strategic Cereal Farm West Host and Emily
Pope, Knowledge Transfer Manager (Arable), AHDB
- 13:10Opening address designing an integrated and
sustainable farming system

John Pawsey, Shimpling Park Farm

13:30 Farm walk

Managed lower inputs – how low can you go without compromising yield

John Pawsey, Shimpling Park Farm and Jonathan Blake, ADAS

The impact of cultivation method on crop rooting – focus on soil health and cost of production Anne Bhogal and Christina Clarke, ADAS

Linking commercial farming with the environment – achieving sustainable agricultural systems

Ben Woodcock, Centre for Ecology and Hydrology

Managed lower inputs

This split-field trial across 17.77 hectares is comparing the effect of low input and farm standard treatments on:

- cost of production
- disease management

The trial was established in winter wheat var. Graham using a deep tine to 20 cm, Vaderstad Carrier discs, drill and roll.



Total input spend:

- Low input £294.47/ha
- Farm standard £337.92/ha
- Difference: £43.35/ha



Seed Slug pellets Fertiliser Herbicide Insecticide T0 T1 T2 T3

Assessments

- Soil health scorecard: bulk density, visual evaluation of soil structure (VESS), earthworm counts, microbial biomass C, nematodes
- Number of tillers and nodal roots per tiller in top 20-30 cm of soil
- Root cores between flowering and grain fill
- Biomass and tissue testing at GS30, 31-33, 39, 61-65 and pre-harvest
- Foliar, stem and ear diseases

More information

- Lead partners: Christina Clarke, Anne Bhogal and Dom Edwards, ADAS
- AHDB develops practical tools for disease forecasting and fungicide performance. More information is available at cereals.ahdb.org.uk/research/diseaseresearch
- The online encyclopaedia of cereal diseases is the definitive guide to cereal diseases in the UK and contains full colour photographs for identification plus information on hosts, symptoms and life cycles
- Fungicide futures is a joint initiative led by AHDB and FRAG-UK to help put good antiresistance practice at the heart of fungicide programmes

Treatments

The impact of cultivation method on crop rooting

Background

Varieties differ in rooting pattern in the same way as there are differences in straw length and canopy characteristics. A recently published AHDB project studied diversity of rooting at depth between different varieties and found that wheat root systems may not be optimal for the acquisition of subsoil water, due to excessive root growth in surface layers and insufficient growth at depth.

The optimum root length density (RLD) to take up water is 1cm/cm³ but previous work in UK fields has shown that current wheat cultivars have RLDs less than this value below 40 cm depths. This issue is important due to the predicted decrease in summer rainfall in the UK and the sensitivity of anthesis and grain fill growth stages to water limited conditions.

Trial design

This replicated tramline trial across 16.88 hectares of medium to heavy clay is investigating the impact of cultivation depth on winter wheat var. Graham:

- cost of production
- crop rooting
- whether crown root traits can indicate rooting success in deeper soil layers

Sampling method

- Three sampling points selected within each zone according to max, min and median penetration resistance
- Three plants sampled in each zone

Assessments

- Soil health scorecard: soil organic matter (SOM), pH, extractable nutrients, bulk density, visual evaluation of soil structure (VESS), earthworm counts, microbial biomass C
- Root number, root angle, root system width, root branching density, root and shoot dry weight in top 20 cm of soil
- Root cores between flowering and grain fill
- Biomass and tissue testing at GS30, 31-33, 39, 61-65 and pre-harvest



Results – crop rooting

Shallow cultivation causes wider root angle due to increased penetrometer resistance. *Will this reduce maximum rooting depth or rooting biomass at depth?*











Nodal root number is positively associated with compaction in the top 15 cm.

Does the crop produce greater number of nodal roots to compensate for restricted growth in root length?

Subsoil compaction (>40 cm) reduces nodal root number, length of nodal roots and aboveground biomass due to the reduction in tillering.



- Lead partners: Christina Clarke, Anne Bhogal and Dom Edwards, ADAS
- Research Review No. 43 Management of cereal root systems
- Student Report No. SR41Quantifying rooting at depth in a wheat doubled haploid population with introgression from wild emmer
- Practical information on soil management and soil assessment methods can be found online ahdb.org.uk/greatsoils

Results – soil health

Results were evaluated in line with the draft Soil Biology and Health Partnership 'scorecard'.

Investigate

Monitor

No action needed

Cultivation depth	5 cm	15 cm	30 cm
% clay	38	39	39
SOM (%)	4.1	4.1	4.1
рН	7.0	7.0	7.7
Ext. P (mg/l)	20	26	16
Ext. K (mg/l)	192	199	216
Ext. Mg (mg/l)	712	821	902
VESS score	4	3	3
Penetration resistance (MPa)	1.12	1.07	1.22
Depth of max resistance (cm)	10	20	30
Earthworms (number)	2	2	4

Understanding the soil health scorecard

- SOM: soil organic matter comparison to 'typical' levels for the soil type & climate
- Ext. P, K & Mg: extractable phosphorus, potassium and magnesium. See: ahdb.org.uk/rb209
- VESS: Visual Evaluation of Soil Structure
 limiting layer score See: sruc.ac.uk
- Earthworms: total number of adults and juveniles; >8/pit = 'active' population for arable soils
- Maximum penetration resistance to 30cm; >2MPa = 'potential limitation to root elongation
 - Some evidence of topsoil compaction in the 5 cm cultivation treatment
 - Subsoil compaction in the 30 cm cultivation treatment



- Lead partners: Christina Clarke, Anne Bhogal and Dom Edwards, ADAS
- Practical information on soil management and soil assessment methods can be found online ahdb.org.uk/greatsoils
- The Soil Biology and Soil Heath Partnership is a 5-year cross-sector programme funded by AHDB & BBRO. Visit: cereals.ahdb.org.uk/shp



Achieving sustainable agricultural systems

Working with the Centre for Ecology and Hydrology, this trial is a real world test of ecological intensification with best agri-tech farming.

Co-designed by the industry, the ASSIST project aims to:

- improve efficiency and reduce environmental impacts of farming
- increase resilience to future threats, including climate change and the ongoing pressure of pest control



Field margins

- 6 m wide
- at least run the length of the two longest sides of a field

In-field strips

- 6 m wide
- run though the centre of fields
- separation of three boom widths (96-108 m depending on equipment) is ideal
- the strips do not need to connect to the headland

Seed mix

- sow at a ratio of 4 kg ha of wild flowers: 10 kg ha of grasses
- choice of species aimed at providing refuge habitats and flower resources

Establishment & maintenance

- firm, fine, weed free seedbed
- broadcast and roll
- sow from late July end August
- if annual weed pressure is high 3 or more cuts might be needed
- Year 1:
 - autumn sowing 1st cut in April
 - spring sowing 1st cut in July
 - final cut each year mid September
- Year 2: single autumn cut depending on weed pressure

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Strategic Cereal Farm West Results Day

27 November 2019

Leamington Spa Football Club, Harbury Lane, Bishop's Tachbrook, Warwickshire CV33 9SA

Book online

ahdb.org.uk/events

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