

Strategic Farm West project overview

Cultivations and crop rooting trial 2018-19

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 aimed to study the phenotypic and genetic diversity of rooting at depth between different varieties. This study stated that wheat root systems may not be optimal for the acquisition of subsoil water, due to excessive root growth in surface layers and inadequate soil exploration at depth. The optimum root length density (RLD) to take up water has been defined as $1\text{cm}/\text{cm}^3$ but past studies in UK field environments have shown evidence to support current wheat cultivars having RLDs less than this defined value below 40 cm depths. This issue is of current importance 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.

Aim

The aim of this trial is to define any differences in rooting properties and cost of production between the different cultivation scenarios.

Methodology

Field site and treatments

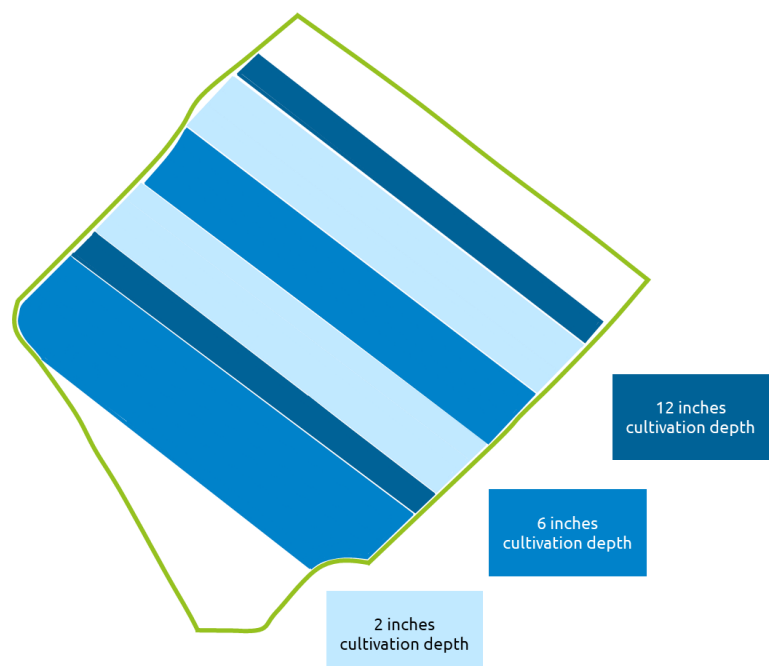
Location: Strategic Farm West, Squab Hall Farm, Harbury Lane, Leamington Spa, Warwickshire CV33 9QB

Field

- Area (hectares): 16.88
- Harvest 2018 crop: canary seed
- Harvest 2019 crop: winter wheat var. Graham
- Soil type: medium to heavy clay

Trial design

- Replicated tramline trial
- 2 replications



- 3 cultivation depths prior to establishing winter wheat in autumn 2018
- Cultivation depths: 2, 6 and 12 inches
- Crop establishment completed using Vaderstad Carrier discs, drill, and roll.

Assessments

The field has been split into six sampling zones to correspond with each treatment area. Within each zone, three sampling points will be identified corresponding to the maximum, median and minimum penetrometer resistance measurements to a depth of 30cm. Each sampling point will be marked and future assessments taken from within a 10m radius.

Soil

- Spring 2019
- Soil health, including topsoil bulk density (5-10cm depth), VESS, earthworm counts, microbial biomass C
- Visual evaluation of soil structure (VESS)

Rooting

- Shovelomics: excavate the crop and the top 20-30cm of soil and assess root crown (number of tillers, nodal roots per tiller) and biomass.
- Root cores: soil cores between flowering and grain fill in wheat to complete root scanning and root biomass assessments.

Crop

- At GS30, GS31-33, GS39, GS61-65 and pre-harvest
- Biomass and tissue testing



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More information

- Lead partners: Christina Clarke and Anne Bhogal, ADAS
- Research Review No. 43 Management of cereal root systems ([online](#))
- Student Report No. SR41 Quantifying rooting at depth in a wheat doubled haploid population with introgression from wild emmer ([online](#))
- Practical information on soil management and soil assessment methodologies can be found online ahdb.org.uk/greatsoils

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