

Approaches to cultivation research

The NFS evaluating cultivation approaches study explores the interaction between cultivation intensity and cover/companion crop use. This research uses a single rotation – based on winter cereals with winter and spring sown break crops – in a fully-replicated experiment on large plots using commercial machinery.

The study compares four levels of cultivation intensity; plough, shallow non-inversion (ca. ≤10 cm), deep non-inversion (ca. 20 cm) and a managed regime (decision decided annually based on prevailing conditions and soil measurements). Each of these approaches is repeated with and without the presence of a cover / companion crop in the break crop seasons.

Relative yield return indicates that the plough tillage approach results in increased yields compared to other cultivation approaches, whilst the highest margins are associated with the shallow and deep tillage approaches. Across the rotation, the inclusion of cover crops gave no significant yield advantage overall compared to not growing a cover crop, regardless of cultivation approach used. In addition, differences in the performance of the crops in the rotation are being seen as the study progresses, for example, findings show some reduction in oilseed rape yield associated with short (alternate) rotations of brassica cover crops.



New Farming Systems

Further information

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The New Farming Systems Project

is managed by NIAB TAG in conjunction with an independent advisory group and supported by The Morley Agricultural Foundation and The JC Mann Trust. The NFS project also contributes to a range of other research programmes.



NEW FARMING SYSTEMS

Improving the sustainability, stability and output of conventional arable farming systems

The New Farming Systems (NFS) project is a series of experiments and system demonstrations. The project aims to explore ways of improving the sustainability, stability and output of conventional arable farming systems. The research takes place on a sandy loam soil at Morley in Norfolk and started in 2007, with an additional study added in 2011.



New Farming Systems (NFS) Project

The project began in 2007 and delivers several ongoing, large-scale fully replicated, rotation projects focusing on improving sustainability, resilience and output. The main research themes are:

1. **Fertility building and cover crops:** the evaluation of the potential fertility building benefits of cover crops and/or legume bi-crops within rotation systems;
2. **Soil amendments (Green waste compost):** determining the value of green waste compost to soils and rotation systems;
3. **Cultivations:** examining cultivation suitability within defined approaches.

An additional study began in 2011:

4. **Soil amendments (MORE – Manure and Organic Replacements Experiment):** looking at a wider range of soil amendment approaches and comparing these to the use of bagged nutrients.



Fertility building and cover crops

The NFS fertility building and cover crops study is a long-term rotational systems experiment examining how novel approaches to cover cropping might contribute to fertility building in arable systems.

This fully replicated experiment contains three crop rotation approaches, based around winter cereals with differing break crop approaches, three nitrogen (N) regimes and four cover crop management systems. The cover crop management approaches specifically explore the use of long-term clover bi-crops, as well as brassica and legume mix based cover crops, sown ahead of spring sown crops in the rotations. Recent findings demonstrated improvements in soil structure (e.g. reduced bulk density and improved water infiltration rates) and improved yield and margin over nitrogen responses from cover crop approaches. Based on spot prices in the years of harvest, mean margin over N improvements of around £40-60/ha have been recorded for specific approaches. Maintaining a clover bi-crop within an arable rotation has proven the challenges of integrating fertility-building elements whilst maintaining crop productivity.

Soil amendments – Green waste compost

This NFS project examines the use of green waste compost originally comprised of three rotational systems with and without the annual application of 35 t/ha of green compost, applied between 2008 and 2011. In 2019 onwards, the study switched to a single rotation to monitor the legacy effect of the green waste compost. The experiment is a factorial design, with four replicates, that received annual additions of green waste compost (ca. 35 t/ha) over a four-year period between 2007/08 and 2010/11. Recent findings have demonstrated improvements in soil structure (e.g. reduced bulk density and improved water infiltration rates) from cover crop approaches. Maintaining a clover bi-crop within an arable rotation has proven the challenges of integrating fertility-building elements whilst maintaining crop productivity.

Research findings, up until 2014, have indicated improved yield and margin over nitrogen responses from specific cover crop approaches.

We plan to update these findings once a further period of cover cropping iterations have been completed.



Soil amendments – Manure and Organic Replacement Experiment (MORE)

This NFS project examines the use of a wider range of soil amendments and comparing these to the use of bagged nutrients. The rotation follows a typical farm rotation based around combinable cropping with sugar beet. The experiment is a factorial design, with three replicates, that received either a single dose (diminished) application or repeated rotationally (augmented) additions of turkey manure (ca. 8t/ha), green waste compost (ca. 35 t/ha) or paper crumble (ca. 50t/ha). Recent findings have demonstrated that incorporating soil amendments (turkey manure, paper crumble and green waste compost) have an impact on nutrient supply and availability and improved crop yields associated with specific soil amendment approaches.