

Using gypsum to improve soil health, water quality and fertiliser use efficiency - Trial Design

10 trial fields across 10 farms:

- Fields selected based on previous projects and ongoing data collection (water quality, soil tests, N-testing [with chlorophyll meter], fertiliser use efficiency [FUE])
- Each field split into control (receiving no gypsum) and trial areas (receiving gypsum)
- Cropping will be diverse across the 10 fields & farms due to varying crop rotations

Methodology

- 1) Preliminary soil testing on each field to establish Ca:Mg ratio, which will inform gypsum application rate. Soils sampled in W-pattern across whole field (including control and trial plots). *Soil analysis by NRM Lab*. Plus replication of Niels Corfield's soil suspension jar tests in each field, for immediate farmer engagement and demonstration of potential.
- 2) Pre-application in-field soil health assessments in control and trial plots by Farm Carbon Toolkit – testing water infiltration rate, soil structure (VESS), aggregate stability and biological activity (worms numbers & activity)
- 3) First application of liquid gypsum post-harvest 2024 to trial plots, ideally alongside autumn cultivations/drilling. *Completed by farmers with spraying equipment*.
- 4) Overwinter water quality testing of arable field drains for nitrate & phosphate. *Water in these pipes has only drained from the trial fields and is not influenced by the wider catchment, however water samples cannot be separated into control and trial areas due to the nature of underground drainage. Water sampling/testing to be completed by farmer samplers and coordinator using photometers*.
- 5) Weekly N-testing (with chlorophyll meter) in control and trial plots during spring growth period to inform nutrient applications (where relevant according to cropping plans). *N-testing completed by volunteers using handheld Yara N-tester at GPS-tagged locations that are representative of whole control/trial plot. Nutrient management across control and trial plots will be kept constant*.
- 6) Interim basic soil assessments by farmers in control and trial plots, including water infiltration, soil structure and aggregate stability. This is primarily a tool to keep the farmers engaged and aware of the changes in their soils, whereas the more crucial data (initial and end assessments) will be done by Farm Carbon Toolkit
- 7) Grain testing at harvest from control and trial plots to calculate fertiliser use efficiency (FUE). *Grain analysis by NRM Lab*.
- 8) Second application of liquid gypsum post-harvest 2025 to trial plots, ideally alongside autumn cultivations/drilling
- 9) Overwinter water quality testing of arable field drains for nitrate & phosphate.
- 10) Weekly N-testing (with chlorophyll meter) in control and trial plots during spring growth period to inform nutrient applications (where relevant according to crop plans).

- 11) Post-application in-field soil health assessments by Farm Carbon Toolkit – testing water infiltration rate, soil structure (VESS), aggregate stability and biological activity (worms numbers & activity)
- 12) Grain testing at harvest from control and trial plots to calculate fertiliser use efficiency (FUE)

Collation of results, including estimates of carbon emissions/reductions and economic impacts of nitrate leaching versus fertiliser savings.

Crop and field management will be identical in the control and trial plots in each field, except for the application of gypsum to the trial plots. Pre- and post-application data will be compared using qualitative assessments as well as repeated measures ANOVA and/or appropriate variations of this test according to the data's independence and distribution of variance.

Revised Timeline

Due to poor weather in the autumn the applications were delayed to spring 2025. Below is the revised timeline for the trial activities.

- Aug/Sep 2024 – Pre-application soil testing & soil health assessments
- March 2025 – First gypsum applications
- Nov 2024 to Jun 2025 – Continuation of water quality & crop nutrition data collection
- Jun/Jul 2025 – Farm walk/cluster event to discuss progress and review initial results
- Aug to Oct 2025 – Second gypsum applications
- Nov 2025 to Jun 2026 – Continuation of water quality & crop nutrition data collection
- Spring/early summer 2026 – Post-application soil health assessments
- Oct 2026 – Final report submitted
- Winter 2026/27 – Results webinar & public event(s)