**The effect of low ground pressure and controlled traffic farming systems on soil properties and crop development for 3 tillage systems (Part IV).**

**Summary:**

This project is a continuation of a unique long-term study investigating the effect of the 3 tillage (deep, shallow, zero) and 3 traffic (controlled traffic farming, low tyre pressure, standard tyre pressure) systems at Harper Adams University, U.K. The work is now showing positive agronomic and economic benefits from improved soil management (Godwin et al., 2020 a), but is season and crop dependant. There is growing interest from farmers, agronomists and researchers in the U.K. and overseas in this study.

The long-term field experimental site was established in 2011 and so far, the research programme has focussed on understanding the effect of different soil tillage and agricultural traffic systems on:

1. Soil conditions and crop yield

2. Soil porosity, pore geometry and connectivity using X-ray Computed Tomography in collaboration with Nottingham University

3. Root development and soil health

Results derived from the first four years of the programme (Godwin et al., 2017) and the subsequent seven years (Godwin et al., 2020 a and b) have shown economic benefits of CTF and lower tyre inflation pressure systems and their effect with different tillage systems.

The aim of this new study is to determine the effect of the already established traffic and tillage systems on the soil environment by concentrating on soil carbon (C) dynamics and C sequestration potential at the long-term traffic and tillage experimental site at HAU.

The specific objectives of the project are:

1. To evaluate the long term effect of traffic and tillage on crop growth and yield on the long-term traffic and tillage experimental site.
2. To conduct an in-depth analysis of the effect of traffic and tillage depth along with the impact of increased crop/root biomass on soil organic carbon fractions.
3. To conduct an in-depth analysis of the effect of traffic and tillage on soil biology by assessing microbial biomass.
4. To evaluate the effect of traffic and tillage on soil’s carbon sequestration function and model the long term effects.
5. To evaluate trade-offs between soil C sequestration, system resilience and yield stability and provide practical recommendations on soil management leading to improved soil health.

**Multi-disciplinary nature of the programme**

The study will be based at Harper Adams University, UK, where the long-term experimental site is located. The experimental plots, including the headlands, occupy the total area of 3 ha. The programme is funded by The Douglas Bomford Trust and The Morley Agricultural Foundation with the in-kind industry support and external collaboration from The Commonwealth Scientific and Industrial Research Organisation (CSIRO) Agriculture and Food (Australia).

The project has a multidisciplinary nature requiring all strong academic abilities and also field (managing field work operations, sample collection, crop assessment) and laboratory practical skills. The interaction with the industry is essential in the success of this project as it links both commercial and academic interests.

**References**

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