

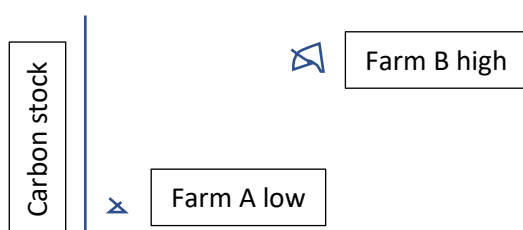
## A PROSOIL+ Factsheet- Measuring Soil Carbon Stocks on Farm

### Introduction

Soil management that captures more carbon is important to help mitigate climate change. Measuring soil carbon (SC) stocks can help us determine whether we need to preserve the high carbon stock or the potential to store (sequester) more. This is useful because a particular soil may have lower SC due to management or potentially be vulnerable to further losses. To help understand the impacts of climate change on UK food production, it is important to understand how to protect total farm soil carbon stocks. The first step is to know where farm carbon stocks are on a scale of low to high. Soil with a high stock of 100t C/ha for example, would have limited potential for further sequestration whereas a soil with a low stock of <50t C/ha could sequester more C with appropriate changes in management.

There are some key points to bear in mind as we consider our strategy for measuring soil carbon stocks (SCS) on farm:

- Total Carbon (TC) stocks change slowly – more bioactive carbon fractions change faster
- It is important not to confuse *stocks* with *fluctuations* in the level of soil carbon; the amount of soil carbon that is stored and lost fluctuates (known as the carbon flux) across the seasons and this depends on soil type. Mineral soils change rapidly; peats change more slowly.
- Soils gain and lose carbon continuously – the balance determines whether soil is a sink or a source for atmospheric carbon
- It is useful to compare and contrast the carbon stocks in soils that are managed in different ways; we can then have an idea where a particular farm / field sits in the overall picture- i.e does it have a low or high stock of carbon and could stocks be increased.



- Once we have an idea about the carbon stock we can start asking questions about the management and processes that would preserve stocks or have potential for increasing sequestration

### **A soil sampling strategy for monitoring current and long-term soil carbon stocks**

1. It is necessary to establish a baseline for on-farm soil C stocks and identify the differences in C stocks due to management practices.
2. Soils should be sampled where there is a change in soil management- soil maps are useful in this regard as they can be used in conjunction with maps holding management information.
3. Whilst identifying significant differences in management, for example cropping, tillage and fertiliser inputs, consideration needs to be given to whether a management practice has been carried out consistently over 10 years on the area of land being sampled.
4. Soil texture (carbon stocks are higher in clay soils) and stoniness is important - stony soils appear to have a higher C content because there are higher C levels between the stones in the fine earth fraction which is sampled. Stones have negligible C. These factors need to be considered when choosing sites to sample.
5. The depth to which C stocks are measured is also important. Much published research in the area of soil carbon sequestration focuses on shallow sampling depths within the 0-30 cm tillage zone; others recommend that the depth of soil sampling has to include the entire root zone to accurately report SC stocks.

### **Things as farmers and landowners to think about for long-term soil carbon preservation**

It is worth remembering soil carbon stocks change slowly- typically with meaningful changes observed over 20 years or so.

- Measure it; how much carbon have I got in my soils? Where is my carbon?
- How do I increase carbon stocks in my soils? What is the potential?
- What is the risk of losing the carbon if I change soil management? How vulnerable is it?
- How do I preserve it?

A whole farm approach is necessary.