Sapperton Soil Journey

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Kyle is a soil scientist for Understanding Ag and soil mentor for Regenerate Outcomes. He grew up on a multi-generation grain and vegetable farm in Indiana with his parents and three siblings. He studied Nutrition for his Bachelor's Degree and has a Master's degree in Soil Microbial Ecology. Since obtaining his graduate degree, Kyle has continued to work in agricultural research. His experiences and education so far have shown him that the food we eat, and the state of the soil are foundational to the health of living creatures and ecosystems. Kyle currently lives in the United Kingdom with his wife, Michelle, where he is educating and consulting farmers as they move forward on their regenerative journeys.

One glance at the news can give even the most optimistic among us reason to pause. Chief among the negative headlines is the rapidly changing climate, which has already led to challenging weather patterns, mass migration and regional conflicts. The scale of work needed to ameliorate these problems is herculean, but there is at least one point of agency in which humans have a tremendous opportunity to change the situation for the better. That point of agency is the soil beneath our feet. Although not immediately obvious, the soil is an essential player in a healthy functioning climate because poor soil health leads to inefficient cycling of energy, water, nutrients and life itself. The probability of experiencing challenging weather patterns, mass migration and regional conflicts increases dramatically as the efficiency of Earth's natural cycles decreases. As 19th century American journalist Alfred Henry Lewis put it, "the only barrier between us and anarchy is the last nine meals we've had."[1]

Conventional agriculture's incentivising use of the plough, fertilizers, and pesticides in the past hundred-plus years has had the unintended consequence of wearing out many soils globally, particularly those that were of marginal agricultural production to begin with. The key to regenerating soil function, and consequently improving climatic conditions, is to incentivise abundant, diverse quantities of life to reappear in the soil. Sapperton Wilder is attempting to do just that by experimenting with ways to improve biodiversity and socioeconomic returns from marginal Cotswold land.

Sapperton Wilder is split into three blocks: a Northern block, a Central block and a Southern block. The Northern block was previously under organic arable management and was also grazed by sheep. This section is being used as a restoration project for species rich grassland. The Central and Southern blocks were historically cereal crop fields farms using conventional methods. The Central block will be put into mixed orchards interspersed with crops and grazed grassland with ancient breed cattle, while the Southern block will be used to test the efficacy of various regenerative farming practices. Implementing a restoration block, an agroforestry block and a strictly regenerative farming block will yield important data comparing and contrasting each system's effect on the soil.

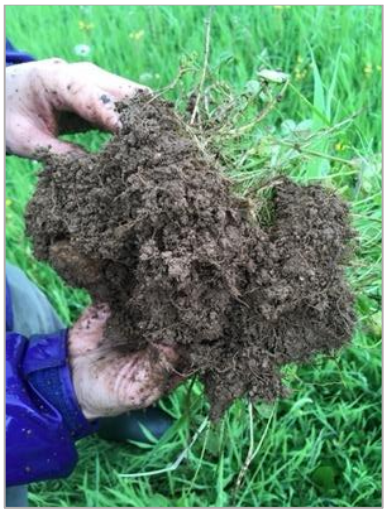
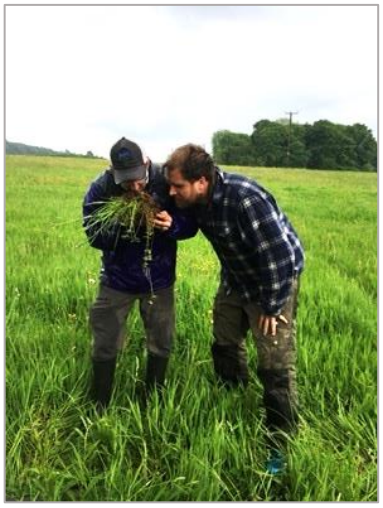
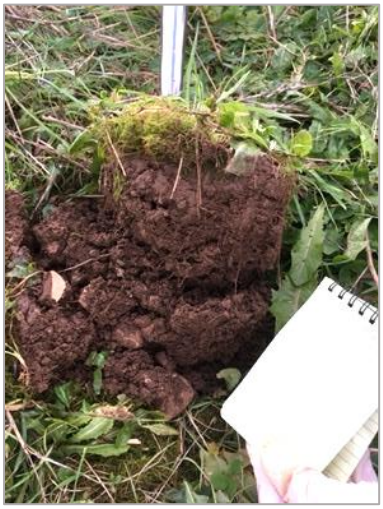
It's very difficult to know how far you've come if you don't know where you started. For this reason, Sapperton Wilder has taken baseline measurements in 2021 to assess the initial state of soils. Datapoints collected include available nitrogen (N), phosphorus (P), potassium (K) and magnesium (Mg), as well as bulk density, which is a good indicator of soil compaction over time. Importantly, soil tests will also be tracking carbon-centric datapoints like organic matter percentage, CO_2 respiration, and the quantity of active carbon in the soil. A simplified way to think about different soil carbon metrics is the following analogy. Soil organic matter can be thought of as the size of the house for soil organisms. Soil respiration indicates the activity of the inhabitants inside the house. Organic carbon is the amount of potential food inside the house, while active carbon is the amount of food immediately available for the inhabitants at the moment of testing. The main point to remember is that life on this planet is carbon-based and cyclical, so the more efficiently carbon cycles in and out of the soil, the more productive that soil will be. This is like water falling and turning a turbine. The water needs to be moving for work to be done. An enormously large quantity of water of still water does not turn of the turbine.

Similarly, we don't necessarily want carbon to be placed in the soil and never leave. Efficient cycling of carbon turns the turbine of life. The beauty of natural systems is that they slowly accumulate more carbon in the soil than is respired out until an equilibrium is reached. At this point, the amount of carbon exiting equals the amount entering, which is the situation in climax forest or grassland ecosystems averaged over time. The goal of farmers is to mimic this process, and soil testing helps track that progress. Bear in mind that certain values like organic

matter can take years or decades to significantly move the needle, depending on the inherent soil and climatic conditions.

For the past two years, Sapperton Wilder has replicated soil tests to compare against baseline values. Sapperton has chosen to rest each of the blocks during that period through the use of herbal leys and wildflower meadows, so these initial results are important in understanding how leys and wildflower meadows affect soil chemical and biological metrics. As it turns out, many soil health indicators are heading in the right direction, including organic matter percentage, CO_2 respiration and active carbon levels. These three metrics show that the abundance and activity of life in the soil are increasing as Sapperton has allowed the land to rest.

As everyone knows, Mother Nature doesn't always play nice, and variables like weather make short-term comparisons very difficult to prove causation, especially with extremely high precipitation levels like those experienced in much of the UK in 2023/2024. Some soil test values decreased from 2021-2023, but this just shows the importance of taking context into consideration, as well as having a long-term perspective. Excessively dry and excessively wet years will hinder biological activity and soil function efficiency. That's just the nature of…. well, nature! It will be very interesting to evaluate how 2024 data stacks up given the action of leys. It's essential we continue to grow our understanding of how aboveground interventions drive improvements in soil health and, ultimately, food yield, biodiversity, and of course income.

Data captured from soil tests is only one piece of the puzzle, however. Observations like visual soil aggregation, soil aroma, animal performance, plant leaf morphology and biodiversity are equally as important to track progress. These are the natural languages that our ancestors relied upon to gain invaluable wisdom without modern technology, and we would be wise to

relearn how to do so ourselves. Such visual progress has already been documented at Sapperton in just two years, which is incredible given the short amount of time that the system has been allowed to heal, relative to previous decades of being overworked.

This is encouraging not only because it shows the potential of farms to produce food in an environmentally-friendly manner, but also because it provides a direct example to farmers across the country that regenerative practices can work. Soil data from subsequent years, along with financial data from future years of arable and livestock production will add an important chapter in the tale of regeneration that humanity needs to write. By documenting the detailed, long-term journey of the soil, Sapperton Wilder are creating a valuable data set that will provide insights into the relationships between management practices and environmental well-being for many years.

References

[1]https://quoteinvestigator.com/2022/05/02/nine-meals/