

Event Report 29: Joel Williams at Prideaux

Date of Event: Tuesday 22nd July 2025

Host: [FNZ Monitor Farmers](#), Martha Prideaux-Brune and Emma Restorick

Over the course of Farm Net Zero (FNZ), soil sampling has revealed that soil carbon content can fluctuate. To understand this better, we were fortunate to have Joel Williams from Integrated Soils tell us about the process of soil carbon sequestration. This meeting was held in the beautiful venue of Prideaux Walled Garden, hosted by [FNZ Monitor Farmers](#), Martha Prideaux-Brune and Emma Restorick. This event was made possible with thanks to the [National Lottery Community Fund](#) who fund the [Farm Net Zero project](#).

Joel began with an overview of the carbon cycle and how photosynthesis is a key part of it, as well as being critical for life on Earth. Joel explained that below-ground biomass (plant roots) is more important than above-ground biomass (shoots and leaves) for carbon sequestration. However, root mass has declined since the Second World War. There are three main contributors to this:

1. A move from perennial crops to annual crops, which don't develop as much below-ground biomass as perennial crops.
2. Breeding higher-yielding crops, which focus on producing above-ground biomass
3. Nitrogen fertilisation, which enhances above-ground biomass.

A reduction in below-ground biomass in the past eighty years may be linked to a reduction in soil carbon content. To reverse this, Joel recommends enhancing below-ground biomass through growing a diversity of plant species and maintaining plant cover on farmland. Maintaining plant cover is particularly important as living plants release root exudates. Joel explained the importance of root exudates for feeding soil microorganisms because they are easier to digest than plant residues, encouraging the microbes to grow and replicate.

Increasing soil microbial content is important for carbon sequestration because the most stable form of soil carbon is dead microbes (necromass). Joel outlined the two types of soil organic matter/ carbon:

1. Particulate organic matter (POM) – decomposing plant material, being eaten by microbes
2. Mineral-associated organic matter (MAOM) – organic matter within soil microbes, including necromass.

MAOM can come from microbes digesting POM but can also be achieved rapidly through liquid root exudates, a reminder of the importance of root biomass for carbon sequestration. When microbes die and create necromass, they have a high tendency to stick onto soil particles (especially clay). This creates very stable soil carbon, which can accumulate and lock carbon up out of the atmosphere. However, as the MAOM relies on soil particles to attach to, it can reach a saturation point as each soil particle gets locked onto. The POM fraction doesn't reach a saturation point but is much less stable and will release carbon back into the carbon cycle more readily. This instability and cycling of POM may explain some of the fluctuations in soil carbon found through FNZ soil sampling.

Key Takeaways:

- Mineral-associated soil organic matter is the most stable form of soil carbon
- Increasing soil microbiology helps to increase mineral-associated soil carbon
- Maximising photosynthesis through the year is the start point for boosting soil biology.

Special thanks must go to [FNZ Demo Farmer](#), Mike Roberts, for suggesting that we hold this meeting, hosting Joel and for leading the introductions to the meeting.