



Microbial Biomass: What is it? And Why does it Matter for Soil Health?

In regenerative agriculture and soil science circles, “microbial biomass” has become something of a buzzword — but what *exactly* is it, and why should farmers, agronomists, and land stewards care about it?

What Is Microbial Biomass?

At its simplest, microbial biomass refers to all the living microscopic life in soil — including bacteria, fungi, protozoa, and other tiny organisms. It’s commonly measured as the amount of carbon contained in those organisms, expressed as micrograms of carbon per gram of dry soil ($\mu\text{g C/g}$). This gives a sense of how much microbial life is in a gram of your soil.

Typically, microbial biomass carbon makes up a small fraction of total soil organic matter, generally around 1 %–5 %, yet this small pool plays an outsized role in soil function.

Why It’s Important

Soil microbes do a *lot* of the heavy lifting beneath our feet, breaking down organic matter, cycling nutrients, and facilitating energy flows from dead plant material into forms usable by living plants.

1. They Drive Nutrient Cycles

Microbial communities are responsible for decomposing organic residues, everything from leftover roots to fallen leaves, and in the process release nutrients. They convert nutrients such as nitrogen, phosphorus, and sulphur into forms that plants can absorb. This process, often called mineralisation, is essential for maintaining soil fertility, especially in low-input or regenerative systems, with microbial communities acting as both a nutrient reservoir and regulator.

2. Microbial Biomass Is a Sensitive Indicator of Soil Health

Microbial biomass responds quickly to changes in soil conditions, taking days, sometimes even minutes to respond to stimuli such as moisture, cover cropping, tillage, or organic amendments. This makes microbial biomass a widely used early indicator of soil quality. Unlike total soil organic carbon, which can take years to change measurably, shifts in microbial biomass can show improvements (or declines) relatively rapidly.

3. Dead Microbes Still Matter: Necromass Builds Soil Carbon

It’s not just the living microbes that are important — when they die, their remains (called necromass) contribute to soil organic matter, helping build soil carbon stocks over time. This microbial necromass can stabilise carbon in soil and influence long-term soil structure and fertility.

4. Impacts on Soil Structure and Function

Healthy microbial biomass does more than cycle nutrients and carbon — it also improves soil physical properties. Microbes help to bind soil particles together into aggregates, improving structure. Better aggregation means better water infiltration and retention, and reduced susceptibility to erosion. This can also mean increase in water holding capacity, reducing runoff, erosion and helping stabilise soil water during extreme weather events like droughts.

How to Support Microbial Biomass on Your Land

If you're looking to boost microbial biomass and the benefits that come with it, consider management practices that:

- Increase organic inputs: Cover crops, crop residues, compost, and other organic amendments feed microbes with carbon.
- Reduce soil disturbance: No-till and reduced tillage help protect fungal networks and microbial habitats.

These practices not only support microbes but also enhance overall soil resilience and productivity, creating a virtuous cycle of soil health.

But first, you need to know what level of microbial biomass you're currently working with to see how your actions are affecting microbial communities. That's why measuring and baselining your soil health indicators, such as microbial biomass, is so important.

To find out more about how PES Technologies can help with in-field rapid soil health indicator data reach out at info@pestechologies.com