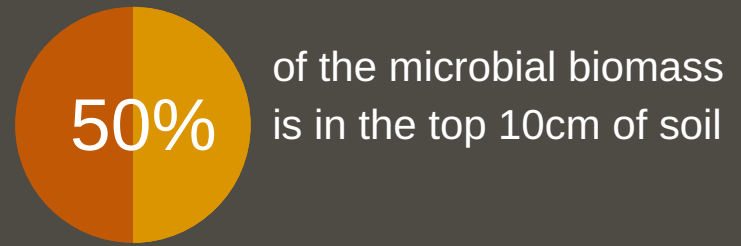
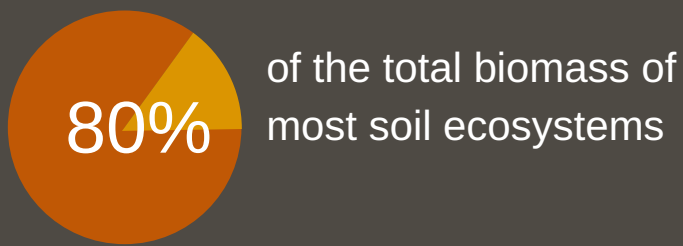


What sort of microorganisms and how many should be in a healthy soil?

Microorganisms are among the most abundant soil organisms



Soil microorganisms promote:

organic matter decomposition

nutrient cycling

soil formation & aggregation

suppression of diseases & pests

plant symbioses

There are 4 main types of microorganisms in the environment



Unicellular bacteria



Archaea (single-celled organisms more closely related to eukaryotes)



Actinomycetes (filamentous bacteria)



Fungi (filamentous forms & unicellular yeasts)

Soil fungi and actinomycetes are the primary decomposers of the complex carbon substrates in organic matter

Organic matter

(chitin, celluloses, hemicelluloses, lignin)

Fungi & Actinomycetes



"Humus"

Microbial numbers vary - there are no absolute target numbers for a soil to be considered healthy

An increase in soil moisture content can lead to a several-fold increase in microbial biomass.

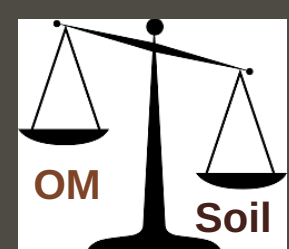
Golf green vs Forest soil



- ✓ Golf greens can have 10-fold greater bacterial and actinomycete numbers
- ✗ Golf greens have lower microbial biodiversity and artificial energy inputs (fertilizer) are needed to maintain populations

Appropriate reference sites should be used for assessing soil microbial community numbers and activities.

Organic matter (OM) additions to soil are generally not a significant source of new microorganisms



Some OM inputs can have high microbial numbers and activities (e.g., biosolids and some composts). Despite this, most soils contain significantly more microbes, so OM inputs generally supply only a fraction of those already present in the soil. Furthermore, these microbes usually disappear rapidly through microbial competition and predation by the soil fauna.

OM additions should be considered a source of nutrients to be used by the existing soil microbes.

How do microbial-based fertilizers and soil probiotics affect soil microbial communities?



These products are marketed as enhancing soil microbial numbers and activities through the addition of beneficial microorganisms. But they do not add significant numbers of microorganisms to those already present in most soils, and the microbial species they contain are unlikely to establish in soils.

They positively influence existing soil microbial communities via the C (usually as molasses) and N (usually as fish extracts) in their formulations. This feeds the soil microbiota and the effects usually last for several days to a few weeks at most.