
Key Functional Groups in the Soil Food Web

Soil organisms can be categorized based on their ecological functions:

Decomposers: Bacteria and Fungi

Nutrient Cyclers: Protozoa and Nematodes

Multitaskers: Arthropods

Engineers: Earthworms and Other Burrowers

Decomposers: Bacteria

Bacteria and fungi are the powerhouses of decomposition, breaking down organic matter and cycling nutrients back into the soil. Bacteria handle the simpler stuff, mineralizing nutrients and making them available for plants. Some bacteria, like nitrogen-fixers, pull nitrogen from the air and convert it into a form plants can use. Others help plants directly by forming symbiotic relationships or producing antibiotics that suppress harmful microbes.

Decomposers: Fungi

Fungi, on the other hand, specialize in the tough jobs —breaking down complex materials like lignin and cellulose (tough or woody plant materials). Their hyphal networks physically bind soil particles together and improve soil structure. Mycorrhizal fungi go a step further, acting as an extension of a plant's root system and producing glomalin, a sticky protein that helps hold the soil together. Some fungi also act as natural defenders, outcompeting or directly attacking plant pathogens.

Nutrient Cyclers: Protozoa & Nematodes

Protozoa and nematodes are grazers in the soil food web, feeding on bacteria and fungi and releasing excess nutrients in plant-available forms. Protozoa and nematodes play a key role in making nutrients accessible to plants. Their grazing stimulates microbial activity, aids in organic matter breakdown, and helps build soil structure.

Multitaskers: Arthropods

Arthropods include insects and all the hard-bodied creatures that inhabit the soil. They are multitaskers, taking on a variety of roles in the soil food web. They act as: Shredders, Predators
Burrowers

Shredders (i.e. millipedes, sowbugs, termites) break down dead plant material, making it easier for microbes to decompose. Predators (i.e. centipedes, spiders, ground beetles) help control pest populations, preventing outbreaks that could harm plant life. Burrowing insects improve soil aeration, water movement, and soil structure while their feeding activities break down bacteria and fungi, thereby cycling nutrients into plant-available forms. Even their waste plays a role by helping bind soil particles together and improve overall soil aggregation.

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Engineers: Earthworms & Other Burrowers

Burrowing organisms are natural engineers, constantly reshaping soil structure and improving its function. As they dig, they create tunnels that improve air circulation, water infiltration, and root growth while reducing soil compaction. By feeding on organic matter, they help break down plant debris, accelerate decomposition and make nutrients more accessible to microbes and plants. Their waste (AKA worm castings) binds soil particles together, strengthening aggregate stability and reinforcing the structure they help create.

Thank You for Reading!

This Information has been adapted from Dr. Elaine Ingham's [The Soil Food Web Essentials Course](#)