

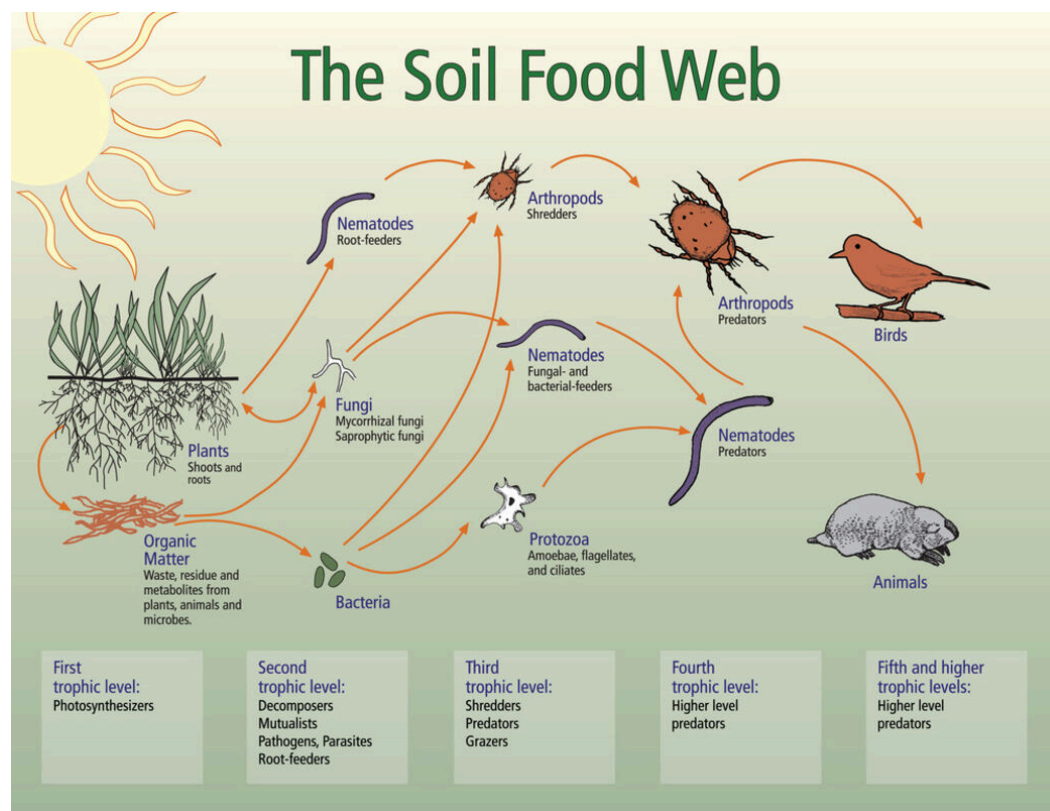
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What is the soil food web?

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By Alex Féthière



The soil food web. (Soil and Water Conservation Society (SWCS). 2000. *Soil Biology Primer*. Rev. ed. Ankeny, IA: Soil and Water Conservation Society)

This week, I started writing a column on massaging a water extract out of compost. Halfway through, I realized you might wonder why I'd bother with all that.

It's been an odyssey for me to realize that compost is multifariously alive. As such, I may never have experienced it fully. I've made compost that did the job for years, but I didn't know why or aspire to better.

The complexity of interactions that comprise a good compost can't be knocked together at a dumpsite. It has to be cultivated from diverse materials that mature in ideal conditions; anything else and you'll have a one-trick pony at best or at worst, a biological weapon. (Spoiled compost has been used as pesticide, and I've used the stinky alcohols in it to lure slugs.)

This matrix of relationships is properly called a web, unlike the simplistic "food chain" that some of us grew up with. All kinds of microcritters eat and depend on each other in the soil and balancing them is key to everything from fertility to pest prevention to water retention.

That we can steward and implant this with our compost is staggering. I have studied many examples of people and firms using biologically complete compost around the world and suspect that it's not front and center in the zeitgeist because there is little to trademark and nothing to patent in it.

The soil food web's ancient affiliations are often compromised by our use of pesticides, fungicides, herbicides and everything from brake fluid to hairspray, so it is both timeless and troubled. Recent science has demonstrated how these dynamics unfold in the absence of chemical complications.

Elaine Ingham wrote the U.S. Department of Agriculture's Soil Biology Primer, and produced the accompanying illustration. The publication is available if you search "USDA soil biology primer," which is way shorter than its ponderous URL.

All plants, be they woody or soft, die down into organic matter that feeds fungi and bacteria. Many plants' living roots also feed bacteria and fungi with nutritious secretions called exudates.

Root-feeding nematodes, of the type that have given all nematodes an undeservedly bad name, nibble roots too. Ideally, they end their malevolent lives in the mandibles of microarthropods.

Bacteria are eaten by microarthropods (like the adorable box mite), nematodes or protozoa. Fungal hyphae - imagine hidden roots that eventually produce the fungus we see - are grazed by the former two of that trio.

Predatory nematodes and larger arthropods are the next trophic level up, and new science has shown that fungal- and bacterial-feeding nematodes are, in fact, food for arthropods. Predatory nematodes are also gobbled by arthropods while arthropods are munched by birds and animals. This last level is just about where our naked eyes can see what's happening.

All of this eating has a natural concomitant, and that is the secret of soil health. The shelf-stable wastes of all these critters stock a pantry for your plants, and the vegetation encourages and curates the contributions it needs by emitting exudates from its roots and aerial parts.

These exudates lure the desired bacteria and fungi that in turn attract higher trophic predators so that the whole is bustling with reciprocal life, crowding out the decay that comes from anaerobic microbes that prosper in suffocating rot.

These lifeforms and wastes can be banked in the soil hundreds of feet down. Tree roots have been measured at 250 feet below the surface seeking water and nutrients in their downward flow.

Aggregates, which are clusters of mineral particles and organic matter joined by bacterial glues and fungal hyphae, keep soil loosely structured and add tilth. In such conditions, water and roots can

penetrate to plutonic depths - and that is an investment we need in a world of erosion and cataclysmic rainfall that polarizes seasonally to a wildfire tableau.

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