

HEALTHY SOIL HEALTHY ENVIRONMENT

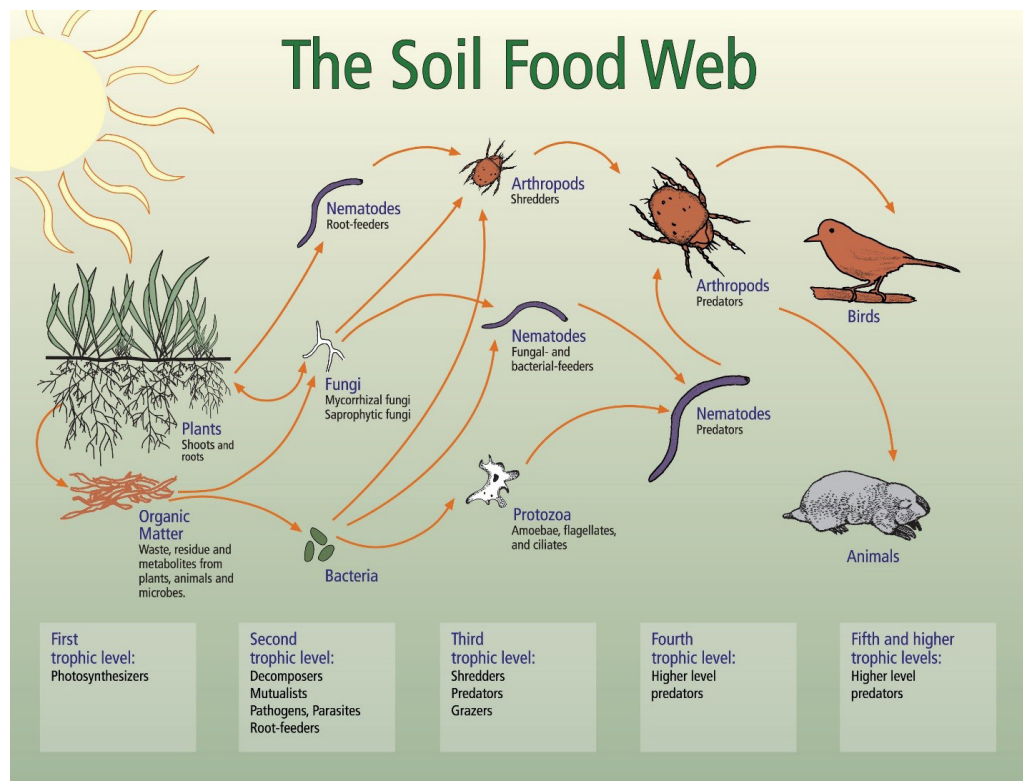
# The Soil Food Web

Alan Sundermeier Extension Educator and Program Leader, Wood County Extension, The Ohio State University.  
 Vinayak Shedekar Postdoctoral Researcher, The Ohio State University.

A healthy soil depends on the interaction of many organisms that make up the soil food web. These organisms live all or part of their life cycle in the soil and are responsible for converting energy as one organism consumes another.

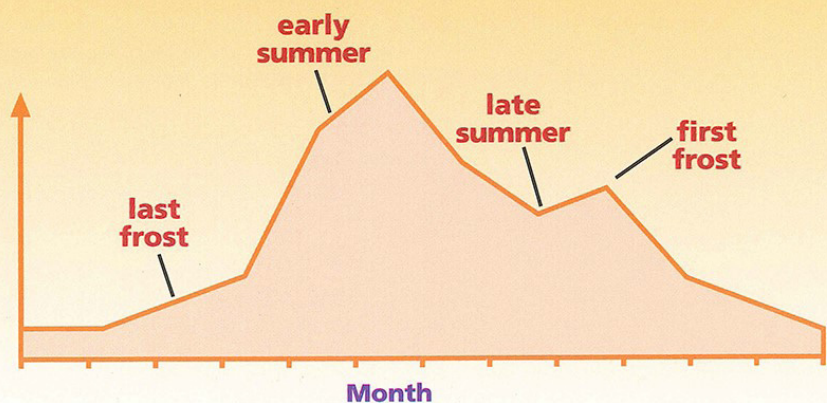
Source: Soil Biology Primer

The phospholipid fatty acid (PLFA) test can be used to measure the activity of the soil food web. The following chart shows that micro-bial activity peaks in early summer when soil is warm and moisture is adequate. Soil sampling for detecting soil microbes should follow this timetable to better capture soil microbe activity.



## Seasonal Microbial Activity

Bacterial and Fungal Activity in a temperate grassland or cropland.



Source: Soil Biology Primer

The soil food web begins with the energy from the sun, which triggers photosynthesis in plants. Photosynthesis results in plants using the sun's energy to fix carbon dioxide from the atmosphere. This process creates the carbon and organic compounds contained in plant material. This is the first trophic level. Then begins building of soil organic matter, which contains both long-lasting humus, and active organic matter. Active organic matter contains readily available energy, which can be used by simple soil organisms in the second trophic level of the soil food web.

The second trophic level contains simple soil organisms, which decompose plant material. Organisms such as pathogens, parasites, and root feeders reproduce in this environment. Bacteria can use more simple organic compounds such as soluble sugars and fresh plant residue, whereas fungi feed on more fibrous plant residue. Soil tillage stimulates bacteria, which rapidly consume active organic matter and deplete this source of energy while releasing excess carbon dioxide.

The third trophic level of the soil food web contains larger soil organisms, which are shredders, predators, and grazers such as protozoa, nematodes, and arthropods. These feed on second level organisms. The fourth and fifth trophic level contains higher-level predators, which feed on smaller soil organisms. Thus, the sun's energy is converted to higher-level mammals, which can be a source of food for humans.

Agriculture can enhance the soil food web to create more soil life by better utilizing the sun's energy. Growing cover crops which photosynthesize at times of the year when grain crops are not growing or active will extend the time period of sunlight capture. Also, reducing or eliminating soil tillage will prevent needless waste of active organic matter consumed by soil bacteria.

### **Resources**

*For more information:*

[nrcs.usda.gov/wps/portal/nrcs/main/soils/health/biology/](https://nrcs.usda.gov/wps/portal/nrcs/main/soils/health/biology/)

*To order the bulletin:*

*(Soil Biology Primer) swcs.org*