



# Soil... Not Dirt

Soil is not dirt. Dirt is the stuff you wash off your hands or sweep off the sidewalk, undesirable stuff to get rid of. Soil, on the other hand, is an ecosystem, a diverse and intricate mix of minerals, organic matter and a range of flora, fauna and fungi.

Although soil is possibly the most important factor in growing healthy landscape and food garden plants, it also may be the least appreciated and understood. Virtually impossible to observe, good soil is a highly functioning and incredibly dynamic ecosystem. According to the USDA Natural Resources Conservation Service, “soil is by far the most biologically diverse part of the earth.”

The complex soil food web is versatile and adaptable. It includes microorganisms (bacteria, protozoa and fungi), earthworms, spiders, beetles, springtails, pillbugs, ants and other arthropods. That list might make your skin crawl, but all these creatures play crucial and interdependent roles toward the building up of healthy soil. Good soils provide ample amounts of available water, air and nutrients—essential to the growth of thriving, attractive and productive plants. Poor soils lack one or more of these essentials, making it challenging, if not impossible, to grow healthy plants.

## What Healthy Soil Does

- 🍃 Organic matter processing. Each organism listed above contributes to break down organic matter both on top of and within the soil, improving its physical and chemical makeup. The processing of organic residues into available and accessible nutrients, called nutrient cycling, is essential. Without it, life as we know it on Earth wouldn't be possible.
- 🍃 Symbiotic relationships. Some specialized bacteria and fungi form mutually beneficial relationships with plants. The ability of legumes to collect nitrogen from the air is made possible by bacteria called Rhizobia. Mycorrhizae are host-specific fungi that attach to roots and create extensive systems of filaments that act like an extension of the root system. This greatly increases the plant's ability to take up water and nutrients and its tolerance of environmental stress.
- 🍃 Water and air infiltration and storage. The movement of creatures through soil creates channels and space for air and water (both critical to plant health and survival) to move throughout the soil.
- 🍃 Pest control. A biodiverse soil does a tremendous job of keeping a wide range of pest organisms in check. Keep this in mind before using pesticides, which reduce the number of beneficial organisms and not just the intended target pest.
- 🍃 Soil stabilization. One product of the breaking down of organic matter is a highly stable material called humus. Humus binds soil particles together into aggregates or clumps, which improves soil structure and makes the soil more resistant to erosion. Humus also buffers the soil pH, helping keep it in a range ideal for plant growth.
- 🍃 Carbon storage. Humus, the end product of organic matter

breakdown, is very effective at storing carbon. It is highly stable and can sequester carbon for decades.

If you are blessed with good soil, count your lucky stars and do all you can to keep it that way. If you are not so fortunate, there are a number of things you can do to improve the biodiversity of your soil and reap its many benefits. Even though their numbers may be low, the good news is that the necessary organisms are probably already present—or nearby and ready to move in. Their populations will increase rapidly with favorable conditions.

## Ways to Improve Soil Fertility and Diversity

- 🍃 Increase organic matter. Spading or tilling compost and/or plant residues into the soil is a great first step since organic matter is the key food in the soil food web. Organic matter also improves the structure and water-holding capacity of soil.
- 🍃 Mulch with organic materials. Mulching is a way to add organic matter from the top down. As mulch breaks down, it filters into the soil. Mulch also helps moderate soil moisture and temperature and reduces compaction from foot traffic and heavy rain.
- 🍃 Water properly. Soil organisms thrive and do their best work in damp, but not soggy, conditions. Too much water, such as from over-irrigating, is harmful to many beneficial organisms.
- 🍃 Limit use of pesticides. If at all possible, let nature take its course. As mentioned earlier, pesticide applications often have negative impacts on beneficial organisms and destroy the natural balance.
- 🍃 Limit tillage. Excessive tilling can be devastating to beneficial fungal networks and soil structure.
- 🍃 Avoid compaction. Compaction, whether from vehicles, mowers, people or the family pooch, limits root growth, increases runoff and reduces the ability of soil to transport essential air and water. It's especially important to stay off the soil when wet. Since correcting compacted soils is a very challenging multi-year process, avoiding compaction in the first place is the best strategy.
- 🍃 Plant native prairie plants. Many native prairie plants have deep and extensive root systems. New roots grow each year, helping to break up tough soil. And old roots die off, providing organic matter and additional channels for air and water infiltration.

Soil really is a miracle of nature, a complex web of self-sustaining interaction that is definitely worth the time to nurture and appreciate. The rewards are beautiful, productive and resilient plants, as well as the satisfaction of knowing you are contributing to a healthier environment. *Kendall Weyers*