

# Responsible, Organic, Simple & Earth-Friendly

## The Soil Food Web

Today we are an educated public thanks to the Internet where one may only type a few words to find out most of the information available on any subject. Much has been written and discussed these days about the benefits of microbes in the soil and the importance of feeding them, who then feed our plants (roses). The "living soil", the Soil Food Web, is no longer a mystery thanks to Elaine Ingham and the powerful electron microscope that can actually see what is going on in the soil not visible to the naked eye. She inspired the writing of a wonderful book called *Teaming With Microbes, A Gardener's Guide to the Soil Food Web* by Jeff Lowenfels and Wayne Lewis, which we highly recommend to anyone wishing to learn all one can about how microbes actually work in the soil to provide minerals for our plants.

Each of us must do what we must do based on our situation, knowledge and experience. The important point we want to make here is that it is difficult and almost impossible to have it both ways. So many rosarians get discouraged when they try to use some organic treatments when they are still using chemicals. In the words of the authors:

"Chemical fertilizers negatively impact the soil food web by killing off entire portions of it. What gardener hasn't seen what table salt does to a slug? Fertilizers are salts. They suck the water out of the bacteria, fungi, protozoa and nematodes in the soil. Since these microbes are at the very foundation of the soil food web nutrient system, you have to keep adding fertilizer

(chemical) once you start using it regularly. The microbiology is missing and not there to do its job, feeding the plants.

When we look at or imagine a forest ecosystem, we realize that no one is fertilizing, watering or spraying for pests and disease. It is a perfectly balanced natural ecosystem operating just fine without interference from man-made fertilizers, herbicides and pesticides. Tall oaks grow from small acorns with no blue powders to feed them or nasty smelling sprays to protect them. Plants flourish nonetheless, thanks to bacteria, fungi, arthropods, protozoa (grazers), organisms that live in symbiotic relationship with mycorrhizae, nematodes, earthworms and photosynthesizers, all populating the environment of plant life, soil and its plants being a residence. The healthiest and most stable ecologies in the natural world are complex, multi-tiered ones with predator and prey creating sustainable balances..."

"You want a few aphids to insure your lacewings and lady bugs stay and do their job, and like the human body, a healthy rose garden is teeming with beneficial bacteria and fungi that keep the pathogenic ones under control. Science has confirmed that a healthy human adult has in their digestive tract three - five pounds of living bacteria representing up to 3,000 species, their cell count exceeding the number of cells in the body! Seventy percent of our total immune



by Pamela  
Greenwald

P.O. Box 1106

Alachua, Florida 32616

[gardenangel22@gmail.com](mailto:gardenangel22@gmail.com)



Left to right: 'Glamis Castle' with a lizard, 'MaryAlice' and the frog and 'Tequilla Rose' with a dragonfly.

system is composed of these microbes." (John Starnes)

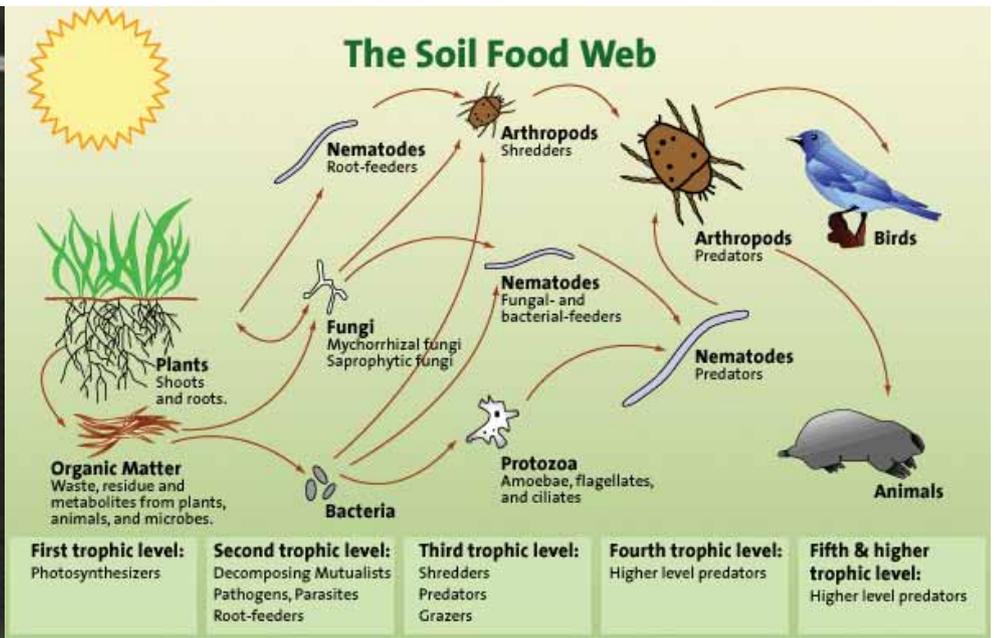
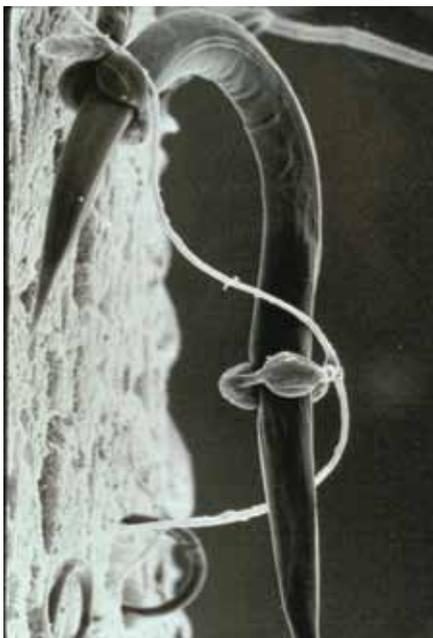
The food web in a desert soil is poverty-stricken with one million bacteria per gram of soil. This sounds like a lot until one finds out that a good corn or wheat ecosystem has 500 million units of life per gram of soil. The more important fact is that the desert environment may have only 5,000 species compared to 15,000 species per gram in a productive soil capable of producing wheat, hay or corn. Scientific proof is now in place proving that conventional agriculture merely mines the soil by annihilating its biotic life.

In his book *Eco-Farm* first published in 1979, Charles Walters puts it this way:

"Farmers tend to think of fungi in the same way most people think of a virus. Cell biologists tell us that once a viral agent enters a warm-blooded body, it stays on for the life of that body. The key is the immune system. A strong immune system simply overpowers a virus. Much the same is true of a soil system. Fungi will always be present in the soil, evil fungi included. A healthy soil system requires the presence of organisms that inhibit, compete with and consume disease-carrying organisms."

Horse manure doesn't end up in drinking water. That's the point. Synthetic fertilizers wash through the soil and wind up in places far from your garden. Any organic amendment or mulch like manure or compost stays where you put it and breaks down slowly so your plants benefit from it, and it doesn't ever enter water systems. Popular synthetic liquid fertilizers cause a lot of problems that are not easily seen by casual

observation; you need a microscope. Yes, plants grow large and produce a lot of nice flowers when you use them, but it is an artificial stimulant of growth and in the long-term, it harms your soil and your local waterways. Eventually the improved growth and flowering is not sustained. Plants grown with chemical fertilizers have less resistance to pests and diseases and gardeners then feel the need to use more harmful chemicals to treat them. It is much smarter to prevent the problems than to cause even more pollution trying to control them. Each of us is responsible for knowing about the harm the products that we use in the garden may cause. The harm of synthetic fertilizers and pesticides is not a theory, a belief, or a cult. This is the reason that not only many states but in fact whole countries are banning the use of chemical fertilizers and insecticides. It is scientific, documented fact. Organic farming has long been admired as an environmentally friendly alternative to conventional agriculture. A new study in the Proceedings of the National Academy of Sciences reported in 2006 found that the intensification in synthetic nitrogen fertilizers have resulted in substantial nitrogen pollution and ecological damage, including the fact that nitrogen compounds from fertilizer can enter the atmosphere contributing to global warming. According to the recently published book *Cooler Smarter, Practical Steps for Low-Carbon Living* written by members of the Union of Concerned Scientists, yard work ranks among the most carbon-intensive activities we engage in. A life cycle analysis of lawn and garden care in Seattle found that one of the leading sources of global warming impacts is the use of (chemical) fertilizers and pesticides. Emissions of nitrous oxide, one of the components released, has a huge effect on the atmosphere even when used in small amounts, and is shown to be 300 times more effective at trapping



The constricting rings of an *Arthrobotrys* spp. fungus capturing a nematode (l.) and The Soil Food Web (r.)

photo courtesy Dr. Hedwig H. Triantaphyllou  
illustration courtesy Dr. Elaine Ingham

heat than carbon dioxide. These fertilizers also enter our watersheds contaminating water tables and causing biological dead zones at the mouths of major rivers. Besides having negative impacts on aquatic life, high nitrate levels in drinking water can cause serious illness in humans. According to the PNAS study, nearly one in 10 domestic wells in the US sampled between 1993 and 2000 had nitrate levels that exceeded the EPA's drinking water standards. The study showed that the use of organic versus chemical fertilizers can play a major role in reducing these adverse effects.

Barry Commoner of Washington University, St. Louis, has shown that nitrogen made synthetically has a different structure from natural nitrogen. The synthetic nitrogen, because it has a different structure, was shown to have polluted the water supply for Decatur, Illinois. The key word here is isotope. Natural nitrogen exists as an isotope quite different from the synthetic product. This difference was flagged in the *Commoner* studies. Nature also flags that difference and lets it all hang out when synthetic nitrogen fed crops fail to field ripen, and when immature proteins lure in insects for a feast.

When one chooses to make the transition from chemical use to organics, it could take one to two years to begin to see the benefits of the efforts to the rose garden. By stopping the use of synthetics, which kill microbes, and replacing them with many different organic materials, attracting birds to the yard with feeders and bird baths, providing beneficial insect havens (diversity of plant life), and most importantly, daily visi-

tation and observance, it is surprising just how quickly Mother Nature appreciates such efforts and rewards us with an abundance of blooms and happy roses who respond to being treated with such respect. You can feel the difference.

We wish to emphasize that it is never too late to start to improve the microbiology of your soil. Mycorrhizal fungi will help your roses and other plants get the nutrients they need as well as the kind of nitrogen they prefer.

"Pathogens face fierce competition. Water drainage and retention are improved. Pollutants are decayed. Food tastes better. Flowers look better. And you don't have to work so hard; you will have lots of helpers. Best of all, you won't have to worry about the affects of chemicals on you or your family, pets, or friends." (*Teaming With Microbes*)

"Sustainable gardening is not a fad. Gardeners need to recognize that we have to be conscious of the life of our soils as well as the garden they support. We gardeners cannot simply resort to using harsh and poisonous chemicals without thinking about what our actions are doing to the life around us. We are not independent but connected to everything in strange and wonderful ways. It is our responsibility to make sure we give back to the land as much as we take." (Peter Kukielski from *The Sustainable Rose Garden*)