

The Importance of a Biologically Active Soil (adapted from Gaia's Garden and Teaming with Microbes, compiled by Melissa Sharapova)

- Soil is Alive!

A teaspoon of good pasture soil may contain a billion bacteria, a million fungi and ten thousand amoebae! That amounts to more animal mass below ground than the mass of the animals grazing the pasture.

- Diversity Supports Diversity

The greater the number and variety of soil organisms the greater the number and diversity of plants the soil can support. That translates as nutrition and food security for all!

The soil organisms in a properly tended garden will furnish almost all of the nutrients that plants need. They do this as they eat, excrete, reproduce and die. Soil fertility comes from this flow or nutrient cycle. The more soil life the greater the flow of excess nutrients to plants. An Edible Forest Garden can mature to have a fully functioning nutrient cycle in about 7 years. As the larger plants mature they drop enough leaves to mulch the entire garden and feed the soil life. No work for the gardener except harvesting?!
Wow.

- The World Needs Decomposers

Each family of organisms excels at decomposing different substances. Bacteria digest the sugars in vegetation. Fungi secrete enzymes and acids that allow them to breakdown lignin (the tough molecule that makes trees so strong). The list of decomposers is long and they all have a unique role.

As the microbes digest they also build soil structure for they secrete gums, waxes and gels that bind tiny soil particles together. Fungi also do this with their threadlike cells. These mini-clumps give rich soil its loose crumbly texture. In addition these goeey microbial by-products protect the soil from drying out as they can hold huge volumes of water.

The final products of decomposition are humus and minerals. Humus is extremely important for a soil's functioning - more on this below.

- Hold on to your Nutrients!

Nutrients from fertilizers don't hang around long in the soil for they are easily leached away by rains and irrigation. A biologically healthy soil combats this in several ways. It's the humus and the life in the soil that hold onto nutrients. Many nutrients are actually held within the living bodies of the soils organisms. Humus can hold vast quantities of water but it really excels at holding nutrients. Humus is a large carbon-oxygen molecule. The negative charge of the oxygen ions, in humus, grabs and holds the positively charged minerals, i.e. calcium, potassium, copper, magnesium, zinc and ammonium (a nitrogen compound). Plants absorb nutrients released during the microbe's life cycles and plant roots produce

enzymes that enable them to “break off” nutrients from the humus molecule as needed. What a beautifully elegant system!

Text compiled by Melissa Sharapova

The Soil Food Web Gardening Rules, from *Teaming with Microbes* by Lowenfels & Lewis

1. Some plants prefer soils dominated by fungi; others prefer soils dominated by bacteria.
2. Most vegetables, annuals and grasses prefer their nitrogen in nitrate form and do best in bacterially dominated soils.
3. Most trees, shrubs, and perennials prefer their nitrogen in ammonium form and do best in fungally dominated soils.
4. Compost can be used to inoculate beneficial microbes and life into soils around your yard and introduce, maintain, or alter the soil food web in a particular area.
5. Adding compost and its soil food web to the surface of the soil will inoculate the soil with the same soil food web.
6. Aged, brown organic materials support fungi; fresh, green organic materials support bacteria.
7. Mulch laid on the surface tends to support fungi; mulch worked into the soil tends to support bacteria.
8. If you wet and grind mulch thoroughly, it speeds up bacterial colonization.
9. Coarse, dryer mulches support fungal activity.
10. Sugars help bacteria multiply and grow; kelp, humic and fulvic acids, and phosphate rock dusts help fungi grow.
11. By choosing the compost you begin with and what nutrients you add to it, you can make teas that are heavily fungal, bacterially dominated, or balanced.
12. Compost teas are very sensitive to chlorine and preservatives in the brewing water and ingredients.
13. Applications of synthetic fertilizers kill off most or all of the soil food web microbes.
14. Rototilling and excessive soil disturbance destroy or severely damage the soil food web.

