



Soil Food Web – Indoor Growing? by Rick Weller, Founder of Organically Done Plant Products

The 'soil food web' is a concept that helps explain the natural processes constantly active in our soil and their interaction with plant life. I wanted to discuss how this works in an indoor organic growing environment but first, a brief discussion of the 'soil food web'.

So, here's how it works. Energy is transferred between species through photosynthesis, consumption and transfer. Plants, and some bacteria, convert sunlight to sugars and 'fix' carbon dioxide. Soil organisms feed on sugars, organic and inorganic matter – these components contain the nutrients and minerals we are familiar with such as nitrogen, calcium, etc. and will

either be retained in an organism's cell structure or released to the plant.

Higher forms of organisms feed on lower forms and release retained nutrients/minerals through excretion or death (reverting back to organic matter), plants uptake nutrients and release them in other forms through exudates, dead plant materials and off-gassing - this cycling process is called 'nutrient cycling' meaning that these nutrients are continuously being converted from one form into another throughout the soil food web.

Roles in the Soil Food Web

Here are the functions that are taking place in the soil food web.

Decomposers break down organic matter. They consume plant material and root exudates (plant excretions) – nutrients contained within these food sources are immobilized (retained) within the decomposers cell structure.

Mutualists form partnerships with plants, typically through root colonization. Plants secrete carbohydrates used by the mutualists which, in turn, supply water and nutrients to the plant, improving plant uptake. Mutualists also provide protection from pathogenic organisms.

Pathogens are organisms destructive to plant and microorganism health.

Chemoautotrophs derive energy (feed) from inorganic compounds and provide for the nutrient cycling of these substances.

Primary Soil Microorganism Classifications

Each type of organism has one or more of these functions.

Bacteria – (decomposer, mutualist, pathogen and chemoautotroph) primary roles includes decomposer of green plant material, fixate nitrogen to plant roots (mutualist).

Fungi – (decomposers, mutualists and pathogens) one of their most familiar roles is as a mycorrhizal mutualist, operating almost as root extenders.

Protozoa – (ciliates, amoebae, flagellates) consume bacteria and release nutrients contained within the bacteria.

Nematodes – consume bacteria, fungi, protozoa and nematodes (regulator of microbial environment).

Other – arthropods, earthworms, insects, birds, mammals, etc. Roles include soil aeration, shredding organic material, nutrient cycling and pest control.



The types and numbers of organisms are primarily effected by the amount of food available but also by climate, pH and vegetation.

Indoor versus Outdoor

An outdoor organic growing environment provides a complete ecosystem with all of the elements discussed above. While this environment can be enhanced using organic methods, it is the 'natural state'. The importance of this 'complete' ecosystem is that functions are in balance including controls mechanisms.



An indoor growing environment will (almost) always be limited in its diversity of organisms (no earthworms, bees, etc.) so the grower must be responsible for some of the food web functions such as soil structure and population control of pests. One of the most difficult aspects of the indoor soil food web to control is the population of pests because we lack some important pest predators.

We all fear infestations (spider mites, fungus gnats, etc.) and this has driven the growth of sterilized growing mediums. Unfortunately, you cannot sterilize without killing beneficial organisms. Prepare your soil mix and store in an isolated area for 2-4 weeks. Look for any evidence of pests before using. While this isn't a guarantee that you are not

introducing unwanted pests, it's a good check. Most pest problems begin when a grower contaminates their growing area with infested plants, clothing or pets.

Getting Started - Outdoor gardens come with a ready-made living environment; indoor gardens, not necessarily. Many of us start with sterilized soil-less media (living organisms intentionally destroyed) and, by itself, not much use to an organic grower. We need to inoculate our medium with microorganisms. Here are some sources:

Earthworm castings – always a good choice if they are quality biologically-active castings.

Compost – most will provide a healthy population of microorganisms (unless packaged and sterilized). Depending on the source (like municipal compost with lawn waste inputs), there may be a potential of pesticide contamination.

'Real' soil – usually a great source of biology (not for teas) and provides additional benefits including a natural living environment for microorganisms, high CEC and buffering capability. Some folks do not like the additional weight and drainage properties but these can be easily managed (20-25% of soil mix).

Packaged biology – quality product can provide good biology but limited diversity of organisms.

Compost teas – great source of biology if made properly (need one of the above for initial microbial population).

By the way, we had a great time at the conference in Ann Arbor - looking forward to more organic growing discussions in Traverse City.

Organically Done (www.organicallydone.com) is a Michigan manufacturer of organic fertilizers and soil amendments. Our mission is to produce high-quality truly organic products that provide everything your plants need while being free of potential contaminating sources that are found in many of today's "organic" alternatives – NOT ALL ORGANICS ARE CREATED EQUAL.