

**Tel: (800) 330-4866  
(352) 323-8213  
Fax: (352) 365-0367**

**www.ccpeat.com  
E-Mail: info@ccpeat.com**

**1650 County Road 470  
Okahumpka, FL 34762**

# Soil Microbiology



In addition to the Chemical and Physical characteristics of soil and potting media, there is a third major characteristic: Soil Microbiology. This characteristic encompasses the overall ecology, or food-web, that exists in soil. The organisms that can be found in soil are either beneficial or detrimental to the health of plants. In well-maintained and healthy soil, the beneficial organisms can keep the detrimental ones in check and will lead to proper plant development. The three main categories of organisms that lend to healthy plant growth are Fungi, Bacteria, and *Actinomycetes*.

---

## Categories of Organisms:

### *Fungi*

Fungi are the most visible of the three types of organisms, forming long filaments called *hyphae* through the surface layers of the soil medium. Beneficial fungi are necessary in soil to decompose organic matter, such as lignin and cellulose, into inorganic compounds that can be used by plants. Nitrogen, for example, must be converted (by fungi or other organisms) into an inorganic compound, such as Nitrate (NO<sub>3</sub>) or Ammonia (NH<sub>4</sub>), in order to be taken up by plant roots.



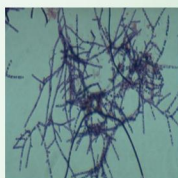
### *Bacteria*



Bacteria are the most numerous organisms found in soil media, with hundreds or thousands of different species in colonies. These organisms are not visible to the naked eye, and typically do not form any filaments or strands, with the exception of *Actinomycetes*. Certain bacteria excrete organic compounds which can bind organic matter and soil particles together, helping to prevent the nutrients from leaving the soil medium.

---

## Actinomycetes



Actinomycetes are organisms that appear similar to fungi visually, but are in fact large colonies of bacteria. These bacteria form filaments or strands similar to fungi hyphae and contribute to the formation of stable organic aggregates in soil – which also enhances the aeration and drainage properties of a soil medium.

## Active Microorganism Characteristics

**In addition to these characterizes that are generally passive towards plants in general, many organisms take on a more active role in the proper development of healthy plants. These active characteristics include: disease suppression, destruction of pollutants and symbiosis.**

### Disease Suppression

Beneficial microbes that are found in abundance in compost are useful in the control of pathogens. These controlling actions are either of General or Specific Suppression in nature. General Suppression is best described as out-competing the pathogens for energy, nutrients or living space. Specific Suppression is undertaken through chemical toxic secretions, which destroy pathogens by breaking down their cell walls, or the outright preying upon pathogenic organisms. Disease Suppression organisms such as: *Gliodadium*, *Pseudomonas*, *Trichoderma*, and *Straptomycetes* are beneficial for specific suppression of such pathogens as E-coli.

### Destruction of Pollutants

The breaking down of pollutants is another beneficial characteristic of soil microorganisms. Contaminants such as chlorinated and non-chlorinated hydrocarbons, solvents, pesticides, and petroleum products can be broken down into simpler components with less potential hazard to the environment.

## Symbiosis and Mycorrhiza

*Mycorrhiza* is the most prolific classification of beneficial symbiotic organisms present in healthy soils. The term *Mycorrhiza*, which means “fungus root”, is applied to certain fungi that live in or around the roots of plants. The symbiotic relationship is formed by the *Mycorrhiza* fungi obtaining carbohydrates from the plant roots, and in return the fungi act as an extension of the roots, gathering water and mineral nutrients. *Endomycorrhizas* organisms penetrate the cell walls and navigate the cell membranes of the root tissue, without causing any harm to the plant. This penetration into the cell wall increases the contact surface area between the *hyphae* and the cell cytoplasm to facilitate the transfer of nutrients between them. Conversely, *Ectomycorrhizas* organisms only interact with the plant roots from the exterior of the cell walls – no penetration into the roots takes place. In both forms of mycorrhiza colonization, the plant will benefit from an increase in the uptake of less available mineral nutrients, such as: phosphorus, calcium, zinc and copper. Additionally, plants with mycorrhiza will have higher rates of photosynthesis, better water use efficiency and the ability to move more carbon compounds to the roots, which results in less pathogens and more nitrifiers around the roots.



## Microbiology of C&C Peat Soil

C&C Peat media, especially mixes made with Nutri-Bark, Enviro-Peat or Class AA Compost, is rich in beneficial microorganisms. Through regular soil tests we have determined that materials that have gone through our composting process possess high levels of *Mycorrhiza* as well as various beneficial bacteria, most notably *Enterobacter cloacae*. **Because of the abundance of beneficial microbes found in C&C Peat mixes, we were surprised to discover that pathogenic microorganisms such as *E-Coli*, *Salmonella* and *Fecal Coliform*, were living in significantly lower colony levels than found in the native soils.** Because of this microbiological advantage, your crops will have healthier growth and the ability to more readily combat various plant diseases.



C&C Peat Company, Inc.

[www.cpeat.com](http://www.cpeat.com) 800-330-4866 [info@cpeat.com](mailto:info@cpeat.com)