



# Symbiotic Secrets in the Soil

## Why plants feed fungi

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There are many plant experts who can help you choose varieties that are both sensible and beautiful. They can also tell you the best location in your garden for the success of these plants. There are some specialists who can help you pick the right fertilizers; some of them may even recommend organics. But have you ever considered the help that beneficial fungi can provide to your plants and your garden?

The relationship between plants and soil fungus has existed for millions of years, and this can be seen in plant fossils around the world. In fact, there is speculation that plants that began moving onto the land from the water would not have been able to make this change were it not for the help of fungi. More than 90% of the plant species on the planet form a beneficial alliance with mycorrhizal fungi. (Mycor means fungus and Rhiza means root.) This is a very sensible description because these fungi live around the root hairs and some can extend

within the plant itself.

When you look at an undisturbed forest system you are witnessing the true complexity of the natural world. How is it that such diversity can exist without nutrient inputs, pest control, scheduled watering or routine pruning? The fungal network that exists in the soil that anchors these plants plays a vital role in assisting the survival of the system.

The relationship between fungi and plants is a very simple one in concept — you help me and I will help you. Plants have developed a very good feeding strategy which is to harness the sun's energy to produce carbohydrates or sugars. This energy along with minerals and organic material from the soil helps them grow. Plants will actually give away some of these sugars to the fungi. Some estimates show plants give away 30-40% of the food they produce. But no one gets a free ride in the natural world, so what are the soil fungi providing to the plants?

Plant roots may seem very fine to the

human eye, but in fact they miss making contact with a vast amount of surface area in the soil. Fungal "roots" or mycelium are much finer and can contact far more soil than plant roots ever could alone. A thimble full of soil can hold several miles of fungal filament. Take a moment to consider the staggering amount of fungi that must exist in undisturbed forest soil. This extensive network has several major benefits which are provided to plants which choose to trade carbohydrates.

With its extensive coverage, the mycelium network is much better at finding small pockets of moisture that the plant roots can't access. This extra water makes a huge difference for plants in times of little rainfall. These fungi also secrete enzymes and organic acids that help mine nutrients from sources that are not available to plants. This helps plants find the minerals they need and are particularly important for nutrients such as phosphorous and iron. Beneficial fungi can increase the root surface area by 10 to

1000 times helping capture extra water and nutrients.

The understanding that we now have about soil fungi relates to research of forests and forestry in the late 1980's. At the time the driving force was a better start for young seedlings placed in clear cut logging blocks. Out of this research has come a broader understanding of the relationship between plants and these soil dwellers.

Our modern agricultural system was built before we understood anything about soil microbiology. Until the last century we knew very little about the soil other than a basic understanding of plant nutrients. There are still many in the world of agriculture and horticulture who choose to ignore the benefits of improving soil microbiology, the complexity of which may hold the future of successful agriculture for a hungry planet. There is research now that supports the fact that fostering these fungi in the soil can reduce fertilizer and water requirements by 30%.