



03



Mycorrhizal Fungi as Companions

LESSON 03

In This Lesson, You Will Learn

- The benefits of mycorrhizal fungi in the vegetable garden
- How to encourage the symbiotic relationship between mycorrhizal fungi and plant roots
- Mycorrhizal fungi and Rhizobium Bacteria
- While 80% of all plants form mycorrhizal relationships, which ones don't

01

Mycorrhizal fungi form a symbiotic relationship with soil communities and plants



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Mycorrhizal fungi are the communication system of the forest floor and the landscape

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They attach to the roots of plants and help the plants obtain nitrogen and other nutrients.



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Mycorrhizal fungi also help plants fight off root nematodes and other root pathogens.



Mycorrhizal

- 80% of plants form mycorrhizal relationships
- Plants with mycorrhizal connections grow more vigorously
- Plants give mycorrhizal fungi sugars and the mycorrhizal give plants nitrogen and other soil nutrients.

Mycorrhizal bacteria have finer, longer roots (*hypha*) that can travel in the soil faster to places that plant roots can't. They enable the plant to get nutrients and moisture from other places in the soil.



Myco-bacteria release powerful enzymes into the soil that can help to solubilize tightly bound soil nutrients, releasing them the plants to use.



This results in many benefits to the plant, including increased vigor, drought resistance, stress resilience, transplant success, and optimized fruiting/flowering.



A study conducted at the University of Guelph concluded that plants with mycorrhizae have double the transplant success of untreated plants. ([source](#))

Legumes

The most well known plants for mycorrhizal relationships are peas, beans, and other legumes.

These plants are nitrogen fixers because of the mycorrhizal fungi that attach to nodes on their root systems.

Other groups of plants form mycorrhizal relationships with Rhizobia bacteria that forms hair-like attachments to plant roots.

These also aid plants in fixing Nitrogen from the air.



**Mycorrhizal
cannot survive
separated from
plant roots.**

Ways to encourage mycorrhizal in the soil

- Practice no-till gardening
- Grow a cover crop
- Don't leave the soil bare
- Grow organically



Should you inoculate your soil with mycorrhizal bacteria?





Mycorrhizal bacteria are every where that plants grow.

If you have root nodules on your peas and beans you don't need to add additional bacteria.

When to add mycorrhizal bacteria to your garden

- If you are growing a garden in the desert
- Switching a garden from chemical to organic growing.
- If you are NOT finding root nodules on your legumes, corn, or squash.
- If you've been rototilling annually and your plants are not growing as well as they used to.



Commercial myco-supplements contain only 3 or 4 of the thousands of myco-bacteria in the wild.

Use the wild strains that are naturalized to your area if you have them.





When starting plants indoors use a potting mix with myco-bacteria added. Your plants will have some advantage when transplanted into the garden.

The other 20% of the plant kingdom

**However, a few plants do not form
mycorrhizal relationships**



- Brassicas like kale, cabbage, broccoli
- Amaranth, including beets and chard
- Dianthus including carnations, pinks, sweet William
- Sedges and Rushes
- Ericaceae or Heath family including Heather, blueberries and bilberries

- By rotating your garden you ensure that plants that need the mycorrhizal bacteria have access to them.
- By keeping a cover crop on the garden beds in the off season, you feed the mycorrhizal bacteria.
- By avoiding tillage you prevent the degradation of soil layers, protecting delicate mycorrhizal bacteria.



“One of the most amazing things about mycorrhizal fungi is their ability to associate with more than one host plant at the same time—in other words, their networks can be shared among plants, even plants of different species.

As a result of this feat, mycorrhizae can benefit entire forests, as the larger trees literally feed and protect the smaller trees through an interconnected mycelial network. And when one plant dies, many of its nutrients are returned to the network and flow toward other plants.”

JEFF LOWENFELS -- *Teaming with Fungi: The Organic Grower's Guide to Mycorrhizae*

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One of the best things you can do to encourage mycorrhizal relationships

1. Switch to no-till gardening
2. Grow organically
3. Use cover crops at the end of the season
4. Use companion planting
5. Plant edible mushrooms in your garden

LESSON PREVIEW

In The Next Lesson, You'll Learn:

- Benefits of growing mushrooms with your vegetables
- 5 easy ways to grow mushrooms in the vegetable garden
- Which mushrooms make good companion plants for vegetables and fruit
- How to turn your mushroom planting into a perennial planting