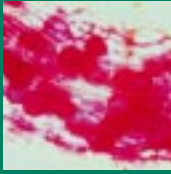


MYCORRHIZAE



Mycorrhizae:
Fungus Roots



Ash clear stained
VAM with vesicles



Produce fine absorp-
tive roots

What buyers need to know about commercially available mycorrhizal fungal products and their practical application.

Fungi Facts

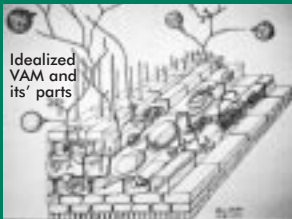
MYCORRHIZAE:

- Benefit more than 99 percent of Earth's plants
- Increase absorptive surfaces of root systems up to 700 percent
- Extend through the soil up to 30 feet away from a plant host
- Can occupy 100 times more soil volume than a non-mycorrhizal plant's entire root system
- Depress many root diseases caused by pathogenic fungi and nematodes

Mycorrhizae Types Matter:

ECTO VS. ENDO

Ectomycorrhizae: Colonize the outside of plant cells and the root to benefit conifers and hardwoods, such as beech, birch, eucalyptus, fir, oak and willow
Endomycorrhizae: Colonize the inside of plant root cells to benefit turfgrasses, most ornamental plants, hardwoods, fruit and nut trees and shrubs



Idealized
VAM and
its parts

How Mycorrhizal Inoculant Products Work

Any condition that affects root growth influences mycorrhizal development. For

example, grossly over-fertilized and watered plants produce rapidly growing absorbing (white) roots that contain few available sugars, so these roots are much less susceptible to mycorrhizal fungal colonization. Also:

- Mycorrhizal fungi only colonize juvenile non-woody roots, not woody or white water roots. For best results, apply them with a root biostimulant product to encourage new root growth.
- Research has shown that soil-enriching bacteria, natural surfactants and soil-water managing gels are very effective in stimulating root fibrocity (fine absorbing roots), rooting depth and mycorrhizal development.
- High light intensity and moderate soil fertility encourage mycorrhizal colonization.
- Some fungicides can have a detrimental effect on mycorrhizae, while some are beneficial. In general, insecticide and herbicide applications do not affect mycorrhizae.
- Once colonized, mycorrhizal fungi spread to new roots in new soil areas and continue to thrive as long as root growth is maintained and soil conditions are appropriate.

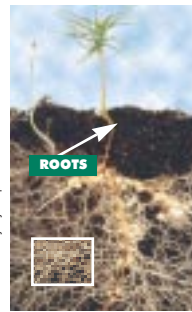
CONTACT PHC TECH SERVICES AT 1-800-421-9051

A Natural

Mycorrhizal Fungi

NATURE'S PLANT PROTECTION

More than 400 million years ago, plants evolved a symbiotic relationship with mycorrhizal fungi—a relationship that remains critical to plant health today.



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Mycorrhizal fungi (fungus roots) are unique, root-inhabiting fungi that colonize plants outside (ectomycorrhizae) or inside (endomycorrhizae) fine absorbing roots to obtain essential organic chemicals. In return, the fungi extend vegetative strands (mycelia) far into the soil to extract water and essential elements and share them with

their host. Mycorrhizae are able to absorb, accumulate and transfer all of the 15 major and minor mineral elements and water to plants more rapidly than roots with no mycorrhizae. Decades of research show that mycorrhizae increase the tolerance of their plant host to drought, compaction, high soil temperatures, heavy metals, soil salinity, organic and inorganic soil toxins and extremes of soil pH. These beneficial fungi also extend life, viability, and productivity of their host root system.

How to Select Mycorrhizal Fungal Products

Commercial access to mycorrhizal fungi is due, largely, to the research begun 40 years ago by the U.S. Forest Service's Dr. Donald H. Marx. Awarded the 1991 Marcus Wallenberg Prize (considered the Nobel Prize for forestry) for his research, Dr. Marx continues his work as Chairman and Principal Scientist of PHC, Inc. The Company is the world's leading producer and supplier of mycorrhizal fungal products.

Experts worldwide agree that use of mycorrhizal fungi in plant health management will become widespread in the new millennium. However, because production of these beneficial fungi requires significant technical investment and expertise, buyers should be very selective about the products they purchase and who they purchase from. Ask these important questions before you make a product purchase:

- Q. Does the product manufacturer, packager and seller have adequate scientific expertise and technical knowledge to guarantee quality and proper use?** Growing, formulating and delivering mycorrhizal fungal inoculants require significant in-house scientific expertise. Four PhD specialists are on staff at PHC, Inc. to ensure quality control, to develop usage guidelines, and equally important, to answer customer questions.
- Q. Are you buying long-lived spores or short-lived propagules?** Many products that claim to be viable endomycorrhizal inoculants contain mostly fungal propagules in root fragments and few viable fungal spores. Published research shows the fungus in these root propagules only survive for 10 to 20 days after production. PHC, Inc. products contain a guaranteed number of quality dormant spores that are viable for a minimum of 18 months after production. PHC, Inc. conducts independent spore viability tests and plant root colonization on all of its products to ensure they work as represented.
- Q. Is the product guaranteed pathogen-free?** Since endo (VAM) spores are produced on plant roots, the potential for the unintentional propagation of fungal pathogens and nematodes with the mycorrhizal fungal inoculum is high. Random sample testing of several commercially available "me-too" products show they contained an abundance of undesirable pathogenic fungi and nematodes. All PHC Mycor™ and MycorTree™ brand products are guaranteed pest-free with the full backup of rigid laboratory Quality Control production standards and protocols.