JRM Chemical, Inc.

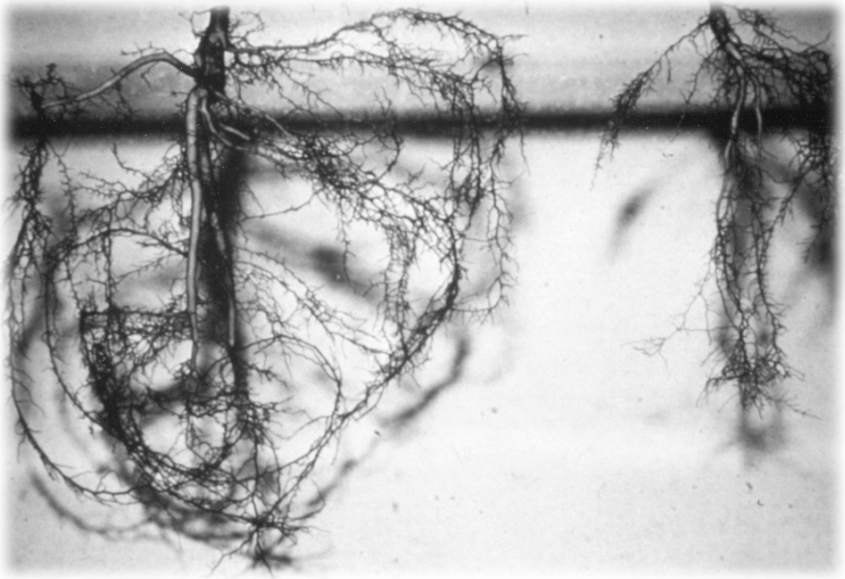
Soil Moist Mycorrhizal Products

Background:

Mycorrhiza is the relationship between the plant root and beneficial fungi. The roots of most plants are colonized by the fungus. This colonization extends far into the soil and are extensions of the root system.

Mycorrhizal fungi is found in undisturbed soils with other beneficial soil organisms. Today's common practices such as tillage, site preparation, road and home construction, mining and removal of topsoil can degrade the mycorrhizal forming potential of soil. These activities can reduce and eliminate these beneficial soil fungi. The reintroduction of mycorrhizal fungi in areas where they have been disturbed and depleted can dramatically improve plant establishment.

The fungi improves the ability of plants to utilize the soil resources by ten to several hundreds of times. Mycorrhizal filaments can extend for several miles in a thimble of soil.



Root mass growth difference with (left) and without (right) Soil Moist Transplant.

Mycorrhizal fungi improve water and nutrient uptake by providing a larger root mass. The fungi release chemicals into the soil which dissolves essential minerals not normally available to the plant such as iron, phosphorous and other bound nutrients. This extraction of minerals is important in plant nutrition and helps explain why non-mycorrhizal plants require high levels of fertility. The fungi create a web mass that captures and assimilates nutrients.

There are over six types of mycorrhiza which differ by type of fungus, type of host plant and the morphology of the interface. These fungi have certain characteristics; they go into the layer of cells that are only found on young roots and pass into the soil forming a bridge to the plant. The two types of mycorrhizal fungi in Soil Moist mycorrhizal products are limited to ectomycorrhizal and endomycorrhizal with several diverse species of each. Endomycorrhizal fungal filiments (hyphae) enter the root cells. They form arbuscules (branched structures) inside the root cells. Ectomycorrhizal fungi do not go into the root cells but on the surface of the small roots. They enter at the roots where the fungal filaments (hyphae) pass between root cells.

Mycorrhizal fungi help reduce plant stress and disease. The larger root mass and web of fungal filaments help increase water absorption. Mycorrhizal fungi attack pathogen or disease organisms entering the root zone of the fungal filaments. Specific antibiotics produced by the fungi kill and immobilize disease organisms. Some fungi protect pine trees from Phtophthora, Fusarium and rhizoctonia disease.

Soil structure is improved with the introduction of mycorrhizal fungi. The filaments produce humic compounds and organic glues (extracellular polysaccharides) that bind soil into aggregates for increased soil porosity. Soil structure and porosity increase plant growth and establishment by promoting root growth and distribution, aeration and water penetration into the root zone.

The most important benefit inoculating soil with mycorrhizal fungi is to the soil and plant ecosystem; improved soil structure, soil microbiology, soil porosity, protection against plant diseases and plant loss. One of the best known effects of mycorrhizal fungi is that plants absorb more phosphorus and grow faster than non-mycorrhizal control plants. Although this

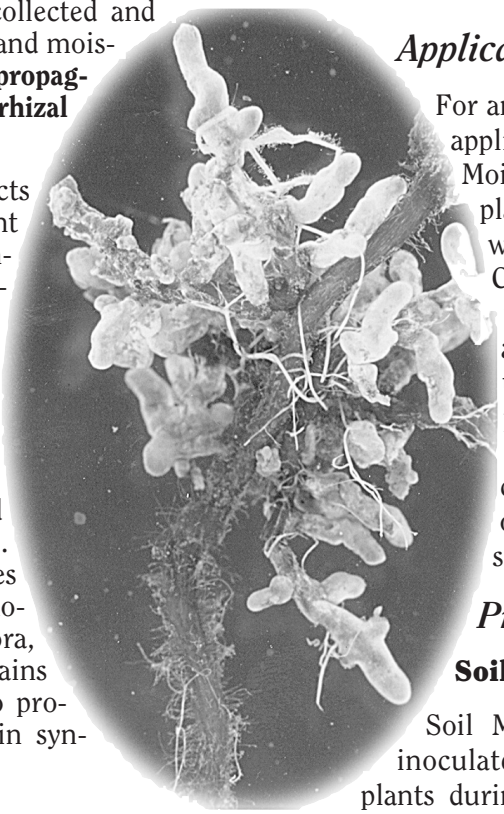
has some importance, the major benefit of inoculation is the improvement of the soil/plant ecosystem which increases plant establishment.

Technical:

High performance mycorrhizal products by JRM Chemical contain a diverse selection of endomycorrhizal and ectomycorrhizal fungi with highly active spore and propagule counts. The arbuscular (AM) endomycorhizal fungi include several kinds of propagules, entities that can produce mycorrhizal colonization. Spores are only a portion of the arbuscular mix. **Mycelium and mycorrhizal root fragments attached to carrier granules are more immediately active and are the only propagules listed in our mix.**

The ectomycorrhizal fungi in Soil Moist mycorrhizal products are adapted to a wide range of host plants and habitat conditions. They are collected and adapted to a variety of temperature and moisture regions. **Only healthy viable propagules are included in the mycorrhizal blend.**

All Soil Moist mycorrhizal products contain a very effective biostimulant formulation with high colony forming units (CFU) of beneficial bacteria. The formulation contains over fifty (50) strains of beneficial soil microbes and natural plant extracts that promote root growth and formulation. Five strains of Trichoderma, a soil fungi, is added to enhance disease suppression and produce natural growth hormones. Some strains of the soil microbes consume the food source for pathogenic fungi as pythium, phytopthora, rhizactonia and fusarium. Other strains of the microbes have the ability to produce antibiotics that inhibit protein syntheses in pathogenic fungi.



Rhizopogon mycorrhizal fungi colonized on roottip.

Fifteen strains of Bacillus bacteria are added to solubilize minerals, decompose organic material and pesticide residues. Bacillus bacteria produce natural growth hormones and enzymes and aid in nitrogen fixation.

Five strains of Psuedomonas bacteria (for nitrogen fixation, disease suppression and production of natural growth hormones) and ten strains of Streptomycetes bacteria (decomposes organic matter and for disease suppression) are included in the biostimulant.

Other components include folic acid and biotin (enhances microbial and plant growth), amino acids (improves nutrient absorption), vitamins (B, B1, B2, B3, B12, C and K) and natural sugars. Natural sugars provide carbon for photosynthesis and act as an energy source for plants and microbes.

Humic acids derived from leonardite are in the formulation. Kelp which is in the formulation is derived from Ecklonia maxima using cellburst technology. This technology produces more active auxins and cytokinins which are plant growth components. The Ecto Tabs and Plant Tabs contain a different biostimulant formulation. Refer to Form 750 and 751.

Benefits:

- Improves soil and plant ecosystem
- Increases plant growth and establishment
- Reduces transplanting stress and plant loss
- Increases nutrient and water uptake
- Improves soil structure and porosity
- Reduces fertilizer use

Application/Storage

For any product to be effective it must be applied correctly. When applying Soil Moist mycorrhizal products, it must be placed in the soil next to the roots where new roots will grow. Colonization will only succeed if the fungi are properly placed. Do not allow the inoculum to be stored in the sun or exposed to freezing temperatures. Store any unused product in a cool dry location resealed in its container. For complete information on each product, refer to the corresponding literature.

Products:

Soil Moist Transplant

Soil Moist Transplant is formulated to inoculate transplanted trees, shrubs and plants during planting time. The formulation contains a diverse blend of seven species of healthy viable ectomycorrhizal propagules and seven species of endomycorrhizal propagules that are adapted to a wide range of plants and habitat conditions. This formulation will provide the inoculated area to colonize on the newly planted stock in a wide variety of growing conditions.

Each pound of Transplant contains over five billion colony forming units (CFU) of bacteria in the biostimulant formulation.

Soil Moist™ water storing polymers are included in the blend to reduce transplant stress and water main-

tenance while increasing the establishment of newly planted stock.

Soil Moist Transplant is packaged in premeasured bags for application ease and in bulk resealable pails.

Refer to Form 782 for complete applications and ingredients.

Soil Moist Root Dip

Soil Moist Root Dip is formulated to inoculate bare-root stock prior to planting. The formulation contains a diverse blend of seven species of healthy viable ectomycorrhizal propagules and seven species of endomycorrhizal propagules that are adapted to a wide range of plants and habitat conditions. Soil Moist Root Dip will provide the inoculated roots to colonize on the planted stock in a wide variety of growing conditions.

Each pound of Soil Moist Root Dip contains over 5 billion colony forming units (CFU) of bacteria in the biostimulant formulation.

Soil Moist Fines™ (50 - 500 microns) are included in the formulation to reduce plant stress and water maintenance while increasing the establishment of the newly planted stock. The small particle size of the Fines suspends the fungi and biostimulants in the slurry mix and increases the cohesion of them to the plant roots for colonization.

Soil Moist Root Dip is packaged in premeasured bags for application ease and in bulk resealable jars for large scale plantings.

Root mass growth difference on pines with (left) and without (right) Soil Moist Root Dip.

Soil Moist Ecto Root Dip is for ecto species host plants only. It is the same formulation as Soil Moist Root Dip without the endomycorrhizal fungi.

Refer to Form 783 for complete applications and ingredients.

Soil Moist Flower Bed

Soil Moist Flower Bed is formulated to inoculate planting areas such as flower beds, trees, shrubs and containers prior to planting. The formulation is for endo specific plants only. Soil Moist Flower Bed contains a diverse blend of seven species of healthy viable endomycorrhizal propagules that are adapted to a wide range of plants and habitat conditions. The formulation will provide the inoculated area to colonize on the newly planted stock in a wide variety of growing conditions.

Each pound of Flower Bed contains over two billion colony forming units (CFU) of bacteria in the biostimulant formulation.

Soil Moist™ water storing polymers are included in the formulation to reduce transplant stress and water maintenance while increasing the establishment of newly planted stock.

Soil Moist Flower Bed is packaged in bulk resealable pails.

Refer to Form 784 for complete applications and ingredients.

Soil Moist Injectable

Soil Moist Injectable is formulated to inoculate existing trees and shrubs using injection equipment. Soil Moist Injectable contains a diverse blend of seven species of healthy viable ectomycorrhizal propagules and seven species of micronized endomycorrhizal propagules that are adapted to a wide range of plants and habitat conditions. The formulation will provide the inoculated area to colonize on the trees and shrubs in a wide variety of growing conditions.

Each pound of Soil Moist Injectable contains over nine billion colony forming units (CFU) of bacteria in the biostimulant formulation.

Soil Moist Injectable is packaged in resealable jars.

Refer to Form 785 for complete applications and ingredients.

Soil Moist Vertimulch

Soil Moist Vertimulch is formulated to inoculate existing trees and shrubs if injection equipment is not used. Soil Moist Vertimulch contains a diverse blend of seven species of healthy viable ectomycorrhizal propagules and seven species of endomycorrhizal propagules that are adapted to a wide range of plants and habitat conditions. The formulation will provide the inoculated area to colonize on the trees and shrubs in a wide variety of growing conditions.

Each pound of Soil Moist Vertimulch contains over 220 million colony forming units (CFU) of bacteria in the biostimulant formulation.

Soil Moist™ water storing polymers are included in the blend to reduce water maintenance and increase the establishment of the planted stock.

Soil Moist Vertimulch is packaged in bulk resealable pails.

Refer to Form 786 for complete application instructions and ingredients.

Soil Moist Transplant Paks

Soil Moist Transplant Paks are formulated to inoculate transplant shrubs and trees during planting time. The Transplant Paks contain a diverse blend of seven species of healthy viable ectomycorrhizal propagules and seven species of endomycorrhizal propagules that are adapted to a wide range of host plants and habitat conditions. The formulation will provide the inoculated area to colonize on the trees and shrubs in a variety of growing conditions.

Each Pak contains over 1 billion colony forming units (CFU) of bacteria in the biostimulant formulation.

Soil Moist Transplant Paks are packaged in bulk bags. Two Paks will treat a 1" caliper tree. Easy to apply, the Transplant Paks are premeasured to eliminate field application errors.

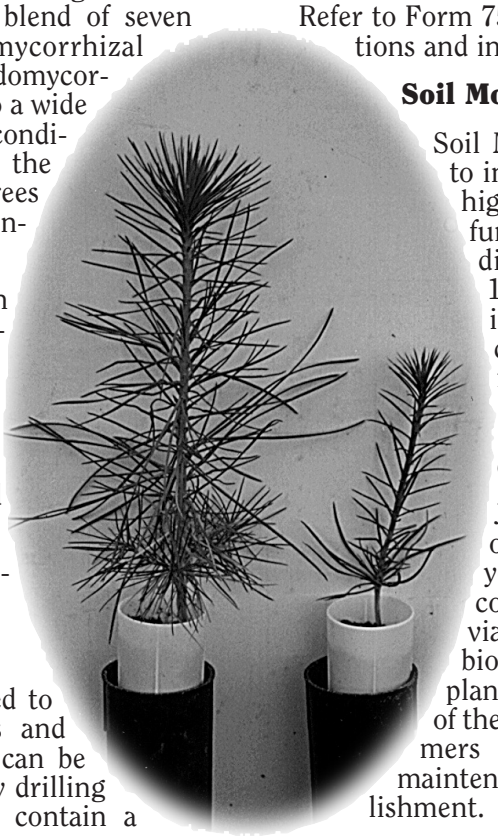
Refer to Form 781 for complete application instructions and ingredients.

Soil Moist Plant Tabs

Soil Moist Plant Tabs are formulated to inoculate transplant trees, shrubs and plants during planting time. They can be applied on existing plant material by drilling holes in the soil. The Plant Tabs contain a diverse blend of five species of healthy viable ectomycorrhizal propagules and seven species of endomycorrhizal propagules that are adapted to a wide range of plants and habitat conditions. This formulation will provide the inoculated area to colonize on the newly planted stock in a wide variety of growing conditions.

The Plant Tabs contain low levels of timed release fertilizers in a fulvic acid base. Indole Butyric Acid (IBA), a rooting hormone, is included in the formulation.

Soil Moist Plant Tabs are packaged in resealable bags and in bulk resealable jars and pails.



Two year field trial on growth difference on pine trees with (left) and without (right) Ecto Tabs.

Refer to Form 751 for complete application instructions and ingredients.

Ecto Tabs

Ecto Tabs are formulated to inoculate transplant trees, shrubs and plants during planting time. Ecto Tabs are for ecto specific host plants only. Ecto Tabs contain the same ingredients as the Plant Tabs but without endomycorrhizal propagules.

Ecto Tabs are packaged in resealable bags and in bulk resealable jars and pails.

Refer to Form 750 for complete application instructions and ingredients.

Soil Moist Seed Inoculant

Soil Moist Seed Inoculant is formulated to inoculate seeds prior to planting. the highly concentrated endomycorrhizal fungi is micronized and contains a diverse three species mix with 100,000 propagules per pounds. The inoculant contains over one billion colony forming units (CFU) of bacteria in the biostimulant formulation. Refer to Form 787 for complete application instructions and ingredients.

JRM Chemical offers a wide variety of mycorrhizal products to meet your planting needs. All products contain a diverse blend of healthy viable propagules with an effective biostimulant formulation to increase plant growth and establishment. Several of the products contain Soil Moist™ polymers to reduce plant stress and water maintenance while increasing plant establishment. For complete information on Soil Moist water storing polymers, refer to Form 145, our web site (www.soilmoist.com) or contact the factory.

Custom blends on any of our products are available to meet specific requirements. Special bulk packaging for large scale plantings are available. Minimum quantities apply

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