

SECTION

MYCORRHIZAL INOCULANT

PART 1 – GENERAL

1.01 THE REQUIREMENT

Under this item the contractor shall furnish and incorporate vegetation specific mycorrhizal inoculation in accordance with the plans, specifications and as directed by the Engineer. This treatment provides a symbiotic relationship between fungus and plant roots that will give the plant improved drought resistance, better growth and aid in the acclimation to the site. Purpose of these treatments is to establish in the root zone beneficial organisms in the ground and within the roots of plants that nearly all plants must have to flourish.

1.02 WORK INCLUDED

- A. Tree, Shrub and Woody Perennial Planting:
DIEHARD™ Transplant: A dry granular mycorrhizal fungi inoculant “cocktail” consisting of endo- and ectomycorrhizal fungi, beneficial bacteria, *Trichoderma*, selected organic microbial nutrients, and a horticultural grade gel that is mixed in the backfill when planting trees and shrubs.
- B. Herbaceous and Bare Root Plants:
DIEHARD™ Root Dip is a mycorrhizal fungi inoculant formulated in a superabsorbent gel. It contains a “cocktail” blend of endo- and ectomycorrhizal fungi and rhizosphere bacteria selected for their beneficial activities in the rhizosphere of plants. This is only for plants smaller than one gallon in size and bare root plants.
- C. Large Shrub Bed Soil Amendment: (Roof Gardens)
DIEHARD™ Bed Prep: A dry granular mycorrhizal fungi inoculant “cocktail” consisting of endo- and ectomycorrhizal fungi, beneficial bacteria, *Trichoderma*, selected organic microbial nutrients, and a horticultural grade gel that is mixed as an amendment into the bed or plant mix.
- D. Where Plants Are Concentrated in Flower Bed Areas:
DIEHARD™ Flower Bed: A dry granular mycorrhizal fungi inoculant “cocktail” consisting of endo- and ectomycorrhizal fungi, beneficial bacteria, *Trichoderma*, selected organic microbial nutrients, and a horticultural grade gel is mixed as an amendment into the bed or plant mix.

- E. Sod, Seeding & Sprigging:
DIEHARD™ Turf: A dry granular mycorrhizal fungi inoculant “cocktail” consisting of endo- and ectomycorrhizal fungi, beneficial bacteria, *Trichoderma*, selected organic microbial nutrients, and a horticultural grade gel that is broadcast and mixed during the preparation of establishing turf.
- F. Established Trees in the Path of Construction
DIEHARD™ Root Reviver™: A dry granular mycorrhizal fungi inoculant “cocktail” consisting of endo- and ectomycorrhizal fungi, beneficial bacteria, *Trichoderma*, selected organic microbial nutrients, and a horticultural grade gel that is applied to trees in stress, or trees that will likely become stressed due to construction activity.
- G. Newly Planted Trees & Shrubs in Stress
DIEHARD™ Root Reviver™: A dry granular mycorrhizal fungi inoculant “cocktail” consisting of endo- and ectomycorrhizal fungi, beneficial bacteria, *Trichoderma*, selected organic microbial nutrients, and a horticultural grade gel that is applied to newly planted trees and shrubs in stress.

1.03 SUBMITTALS

- A. The Contractor shall furnish a certified report from an approved testing laboratory showing a full analysis of a representative sample of the Mycorrhizal Inoculation products for consideration as an “approved equal”.
- B. The Contractor will provide the Engineer a 1 lb. or tablet sample of each type of fertilizer and inoculant 2 weeks prior to the start of the application.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Tree, Shrub and Woody Perennial Planting. A mycorrhizal (ecto- and endomycorrhizal) inoculation, Horticultural Alliance's DIEHARD™ Transplant, (P.O. Box 5744, Sarasota, FL 34277, Tel: 800-628-6373, or approved equal.

DIEHARD™ Transplant Product Specification:

Endomycorrhizal	11 Propagules per cubic centimeter <i>Glomus mosseae</i> (2), <i>Glomus intraradices</i> (2), <i>Glomus fasciculatum</i> (2), <i>Glomus dussii</i> (1), <i>Glomus clarum</i> (1), <i>Glomus deserticola</i> (1.50), <i>Glomus microaggregatum</i> (1.50).
Ectomycorrhizal	180,000 spores per cubic centimeter to include: <i>Pisolithus tinctorius</i> (154,800) and <i>Rhizopogon</i> (25,200).
Nitrogen Fixing, Phosphate solubilizing, and Growth Promoting Bacteria.	800,000 Colony forming units per cubic centimeter of <i>Genus Bacillus</i> (32 species), <i>Genus Pseudomonas</i> (2 species), <i>Genus Streptomyces</i> (2 species).
<i>Trichoderma</i>	1,200,000 Colony forming units per cubic centimeter of <i>Trichoderma</i> (6 species) <i>Gliocladium virens</i> (2 strains), <i>Trichoderma harzianum</i> (2 strains), <i>Trichoderma viride</i> (2 strains).
Humic Acid	22% derived from <i>Leonardite</i>
Sea Kelp Extract	11% <i>Ascophyllum nodosum</i>
Yucca Plant Extract	7% <i>Yucca schidigera</i>
Root Promoting Vitamins	B, B2, B3, B6, B7, B12, C, K, Biotin, Fulvic Acid
Amino Acids	Animal and Plant Proteins
Horta-Sorb® MD Water Gel Particle Size Percent Soluble Absorption Rate	Minimum 29% cross linked copolymer 1.0 mm to 2.0 mm, maximum 5 % < 1.0 mm Less than 5 % 300 - 400 times in distilled water

B. Herbaceous and Bare Root Plants. A mycorrhizal (ecto- and endomycorrhizal) inoculation, Horticultural Alliance's DIEHARD™ Root Dip, (P.O. Box 5744, Sarasota, FL 34277, Tel: 800-628-6373, or approved equal.

DIEHARD™ Root Dip
Product Specification

Endomycorrhizal	92 Propagules per cubic centimeter: <i>Glomus mosseae</i> (18.4), <i>Glomus intraradices</i> (18.4), <i>Glomus fasciculatum</i> (18.4), <i>Glomus dussii</i> (9.2), <i>Glomus clarum</i> (9.2), <i>Glomus deserticola</i> (9.2), <i>Glomus. microaggregatum</i> (9.2).
Ectomycorrhizal	1,080,000 spores per cubic centimeter to include: <i>Pisolithus tinctorius</i> (928,800), <i>Rhizopogon</i> (151,200).
Humic Acids	1% derived from <i>Leonardite</i>
<i>Trichoderma</i>	324,000 CFU's per cc to include <i>Genus Trichoderma</i> (6 species), <i>Gliocladium virens</i> (2 strains), <i>Trichoderma harzianum</i> (2 strains), <i>Trichoderma viride</i> (2 strains).
Soluble Yucca Extract	1% <i>Yucca schidigera</i>
Soluble Sea Kelp Extract	1% <i>Ascophylum nodosum</i>
Nitrogen Fixing, Phosphate Solubilizing, and Growth Promoting Bacteria.	216,000 Colony forming units per cubic centimeter of <i>Genus Bacillus</i> (32 species), <i>Genus Pseudomonas</i> (2 species), <i>Genus Streptomyces</i> (2 species).
Root Promoting Vitamins	Biotin, Folic Acid, B, B2, B3, B6, B7, B12, C, and K
Horta-Sorb® SM Water Management Gel	55% Cross linked copolymer
Particle Size	0.3 mm to 0.8 mm, maximum 5 % < .075 mm
Percent Soluble	Less than 5 %
Absorption Rate	250 - 400 times in distilled water
Fade Resistance	Hard crystals, firm to touch with no more than very slight softness.
Toxicity	Nontoxic. Certificate of analysis must certify that the free acrylamide monomer level is less than 0.05 %.

C. Large Shrub Bed Soil Amendment (Roof Gardens). A mycorrhizal (ecto- and endomycorrhizal) inoculation, Horticultural Alliance's DIEHARD™ Bed Prep, (P.O. Box 5744, Sarasota, FL 34277, Tel: 800-628-6373, or approved equal.

DIEHARD™ Bed Prep
Product Specification

Endomycorrhizal	27 propagules per cc to include: <i>Glomus mosseae</i> (5), <i>Gigaspora intraradices</i> (5), <i>Glomus fasciculatum</i> (5), <i>Glomus dussii</i> (3), <i>Glomus deserticola</i> (3), <i>Glomus clarum</i> (3) and <i>Glomus microaggregatum</i> (3).
Ectomycorrhizal	2,160,000 per cc to include - 2 species- <i>Pisolithus tinctorius</i> (1,857,600), <i>Rhizopogon</i> (302,400).
Nitrogen Fixing, Phosphate solubilizing, and Growth Promoting Bacteria.	230,400 CFU's per cc to include: <i>Genus Bacillus</i> (32 species), <i>Genus Pseudomonas</i> (2 species), <i>Genus Streptomyces</i> (2 species).
<i>Trichoderma</i>	345,600 CFU's per cc to include: <i>Genus Trichoderma</i> (6 species), <i>Gliocladium virens</i> (2 strains), <i>Trichoderma harzianum</i> (2 strains), <i>Trichoderma viride</i> (2 strains).
Humic Acid	10% derived from <i>Leonardite</i>
Sea Kelp Extract	1% <i>Ascophylum nodosum</i>
Yucca Plant Extract	1% <i>Yucca schidigera</i>
Root Promoting Vitamins	B, B2, B3, B6, B7, B12, C, K, Biotin, Fulvic Acid
Amino Acids	Animal and Plant Proteins
Horta-Sorb® MD Water Gel	17% cross linked copolymer
Particle Size	1.0 mm to 2.0 mm, maximum 5 % < 1.0 mm
Percent Soluble	Less than 5 %
Absorption Rate	300 - 400 times in distilled water

D. Where Plants Are Concentrated in Flower Bed Areas. A mycorrhizal (endomycorrhizal) inoculation, Horticultural Alliance's DIEHARD™ Flower Bed, (P.O. Box 5744, Sarasota, FL 34277, Tel: 800-628-6373, or approved equal.

DIEHARD™ Flower Bed
Product Specification

Endomycorrhizal	18.7 Propagules per cubic centimeter: <i>Glomus mosseae</i> (3.74), <i>Glomus intraradices</i> (3.74), <i>Glomus fasciculatum</i> (3.74), <i>Glomus dussii</i> (1.87), <i>Glomus clarum</i> (1.87), <i>Glomus. deserticola</i> (1.87), <i>Glomus. microaggregatum</i> (1.87).
Nitrogen Fixing, Phosphate solubilizing, and Growth Promoting Bacteria.	184,000 CFU's per cc to include: <i>Genus Bacillus</i> (32 species), <i>Genus Pseudomonas</i> (2 species), and <i>Genus Streptomyces</i> (2 species).
Trichoderma	276,000 CFU's per cc to include Genus <i>Trichoderma</i> (6 species), <i>Gliocladium virens</i> (2 strains), <i>Trichoderma harzianum</i> (2 strains), <i>Trichoderma Viride</i> (2 strains).
Humic Acid	14% derived from <i>Leonardite</i>
Sea Kelp Extract	33% <i>Ascophylum nodosum</i>
Yucca Plant Extract	1% <i>Yucca schidigera</i>
Root Promoting Vitamins	B, B2, B3, B6, B7, B12, C, K, Biotin, Fulvic Acid
Amino Acids	Animal and Plant Proteins
Horta-Sorb® MD Water Gel Particle Size Percent Soluble Absorption Rate	Minimum 12 grams per pound cross linked copolymer 1.0 mm to 2.0 mm, maximum 5 % < 1.0 mm Less than 5 % 300 - 400 times in distilled water

E. Sod, Seeding & Sprigging. A mycorrhizal (endomycorrhizal) inoculation, Horticultural Alliance's DIEHARD™ Turf, (P.O. Box 5744, Sarasota, FL 34277, Tel: 800-628-6373, or approved equal.

DIEHARD™ Turf
Product Specification

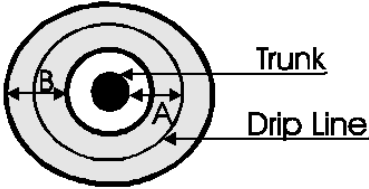
Endomycorrhizal	8.6 Propagules per cubic centimeter <i>Glomus mosseae</i> (1.72), <i>Glomus intraradices</i> (1.72), <i>Glomus fasciculatum</i> (1.72), <i>Glomus dussii</i> (.86), <i>Glomus clarum</i> (.86) <i>Glomus deserticola</i> (.86), <i>Glomus microaggregatum</i> (.86).
<i>Trichoderma</i>	240 Million per pound of <i>Genus Trichoderma</i> (6 species), <i>Gliocladium virens</i> (2 strains), <i>Trichoderma harzianum</i> (2 strains), <i>Trichoderma viride</i> (2 strains).
Nitrogen Fixing, Phosphate solubilizing, and Growth Promoting Bacteria.	160 Million colony forming units per lb. to include <i>Genus Bacillus</i> (32 species), <i>Genus Pseudomonas</i> (2 species), <i>Genus Streptomyces</i> (2 species).
Humic Acid	22% derived from <i>Leonardite</i>
Sea Kelp Extract	26% <i>Ascophylum nodosum</i>
Yucca Plant Extract	1% <i>Yucca schidigera</i>
Root Promoting Vitamins	B, B2, B3, B6, B7, B12, C, K, Biotin, Folic Acid
Amino Acids	Animal and Plant Proteins
Horta-Sorb® MD Water Gel Particle Size Percent Soluble Absorption Rate	90 Grams/Lb . acrylamide copolymer 1.0 mm to 2.0 mm, maximum 5 % < 1.0 mm Less than 5 % 300 - 400 times in distilled water

F. Newly Planted Trees & Shrubs in Stress. A mycorrhizal (endomycorrhizal) inoculation, Horticultural Alliance's DIEHARD™ Root Reviver, (P.O. Box 5744, Sarasota, FL 34277, Tel: 800-628-6373, or approved equal.

DIEHARD™ Root Reviver™
Product Specification

Endomycorrhizal	6.8 Propagules per cubic centimeter: <i>Glomus mosseae</i> (1.37) <i>Glomus intraradices</i> (1.37), <i>Glomus fasciculatum</i> (1.37), <i>Glomus dussii</i> (0.68), <i>Glomus clarum</i> (0.68), <i>Glomus deserticola</i> (0.68), <i>Glomus microaggregatum</i> (0.68).
Ectomycorrhizal	300,000 spores per cubic centimeter to include: <i>Pisolithus tinctorius</i> (258,000), and <i>Rhizopogon</i> (42,000).
Nitrogen Fixing, Phosphate solubilizing and Growth Promoting Bacteria.	400,000 CFU's per cc to include <i>Genus Bacillus</i> (32 species), <i>Genus Pseudomonas</i> (2 species), <i>Genus Streptomyces</i> (2 species).
<i>Trichoderma</i>	600,000 CFU's per cc to include <i>Genus Trichoderma</i> (6 species), <i>Gliocladium virens</i> (2 strains), <i>Trichoderma harzianum</i> (2 strains), <i>Trichoderma viride</i> (2 strains).
Humic Acid	41% derived from <i>Leonardite</i>
Sea Kelp Extract	19% <i>Ascophyllum nodosum</i>
Yucca Plant Extract	1% <i>Yucca schidigera</i>
Root Promoting Vitamins	B, B2, B3, B6, B7, B12, C, K, Biotin, Fulvic Acid
Amino Acids (Protein)	Animal and Plant Proteins
Horta-Sorb® MD Water Gel	5% Cross linked copolymer
Particle Size	1.0 mm to 2.0 mm, maximum 5 % < 1.0 mm
Percent Soluble	Less than 5 %
Absorption Rate	300 - 400 times in distilled water

PART 3 - DIRECTIONS FOR USE

- A. Tree, Shrub and Woody Perennial Planting: Use 4-oz. per each foot diameter of the root ball or per inch caliper. Mix into the backfill when transplanting. Placement shall be in the upper 8-10 inches of the planting pit adjacent to the root ball. Apply water to mud-in the tree. Store product in a dry, cool place being mindful that product is not to be exposed to high heat over 105° F. for periods in excess of four hours.
- B. Herbaceous and Bare Root Materials: Mix DIEHARD™ Root Dip with water into clean pails per manufacturer's directions at a rate of 1 lb. per 10-gallons of water. Let stand for 15-20 minutes. Adjust thickness of mixture to insure that the gel adheres to the roots when dipping. Dip roots to coat thoroughly and plant. Mix only enough product to treat plants immediately. Ten gallons of gel will treat 3,000 plants. Store product in a dry, cool place being mindful that product is not to be exposed to high heat over 105° F. for periods in excess of four hours.
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- C. Large Shrub Bed Soil Amendment: (Roof Gardens) DIEHARD™ Bed Prep: Apply product at a rate of 3 lbs per 100 square feet and incorporate into the first 8 inches of soil. Product may be amended into prepared top soils to achieve 3 lbs of product per 100 square feet based upon the depth of soil required. Store product in a dry, cool place being mindful that product is not to be exposed to high heat over 105° F. for periods in excess of four hours.
- D. Where Plants Are Concentrated in Flower Bed Areas: DIEHARD™ Flower Bed: Mix thoroughly into the top 8 – 10 inches of bed at the rate of 3 pounds per 100 square feet. Store product in a dry, cool place being mindful that product is not to be exposed to high heat over 105° F. for periods in excess of four hours.
- E. Sod, Seeding & Sprigging: DIEHARD™ Turf: Broadcast or spread at the rate of 2 pounds per 100 square feet. Work into the top 2 inches of ground. Seed, sprig, lay sod as usual. Store product in a dry, cool place being mindful that product is not to be exposed to high heat over 105° F. for periods in excess of four hours.
- F. Established Trees in the Path of Construction: DIEHARD™ Root Reviver™: Make holes in a 2 ½ to 3-foot grid pattern. Apply 3 to 6 oz. per hole (2" wide x 8" deep) in a 3 ft. grid. Mix product with soil removed in the top 6-8" of hole. The following placement is suggested:

Store product in a dry, cool place being mindful that product is not to be exposed to high heat over 105° F. for periods in excess of four hours.

G. Newly Planted Trees & Shrubs in Stress: DIEHARD™ Root Reviver™: Make holes around the root ball (4 holes per inch caliper). Apply 3 to 6 oz. per hole. Mix product with soil removed. Fill top 6-8” of hole with mixture and water in. Store product in a dry, cool place being mindful that product is not to be exposed to high heat over 105° F. for periods in excess of four hours.

PART 4 – EXECUTION

Use in strict accordance with supplier's instructions and recommendations.

PART 5 – MANUFACTURERS SERVICES

At the request of Landscape Architect manufacturer is to provide the services of a qualified technical representative to instruct the user in proper mixing and handling of the product.

PART 6 – VERIFICATION OF USE

At the request of the Landscape Architect excavation of random plots of up to 1% of planted materials. Landscape Architect shall determine, or alternatively require the Contractor to determine and submit to the Landscape Architect, how much materials are required on each job by using the INTERACTIVE SPECIFICATION sheet on the web at www.horticulturalalliance.com/spec.1.htm, or by providing manufacturer with plant list, in which case the manufacturer will do the take off and provide volume requirements to the Landscape Architect and the Contractor. Landscape Architect shall require receipts for materials purchased to verify use. Additionally, Landscape Architect may require submittal of all empty bags of supplies purchased. Landscape Architect shall require alternative procedures if product has not been used based upon manufacturer's recommendations.

END OF SECTION

Interactive Landscape Architect Web Site

www.horticulturalalliance.com/spec1.htm

Input job specific info, plant size and quantities and include the exact product and amounts in your specification - thus, almost eliminating any contractor “errors”.

Free Services Provided to Specifiers

- We do a take off for you - fax your plant list to us and we will do a take off and fax back to you the amount of materials required for the job.
- We introduce your contractors to our products - give us a list of your contractors and we will introduce, educate and provide them with installation information and list of materials for the job.
- With toll-free phone (800-628-6373) and fax lines (888-386-4478) we are at your service at a moments notice.
- We provide verification to you that the contractor has purchased products – just ask and we will track this and provide you the information.

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