EcoMicrobials™

EcoFungi

EcoFungi are fungi that grow in and out of the roots of plants resulting in improved growth, vigor and pro ductivity of plants.

EcoFungi increases the ability of the plant to get water and nutrients from the soil, by increasing up to 1000 times the area of soil where the plant gathers its nutrients. Furthermore, EcoFungi has the ability to extract nutrients that are not chemically available to the plant.

EcoFungi needs to be applied in direct contact with the roots of plants.

- EcoFungi can be mixed with seeds before planting.
- The roots of plants can be dipped in a solution made up with EcoFungi before transplant.
- EcoFungi can be injected in the soil, close to the roots of established plants.

Benefits of EcoFungi for plants

- Uniformity in plant development
- Early formation of flowers and fruits
- Increase in yield and quality of flowers and fruits
- Reduction in the requirements for water, fertilizers and pesticides
- Improvement in soil quality
- Reduction of stress caused by transplant and planting, drought, extreme temperatures, heavy metals, pesticides and deleterious microbes.

EcoFungi is a vesicular arbuscular mycorrhizal (VAM) inoculant certified in the USA by the Organic Materials Review Institute (OMRI) and The California Department of Food and Agriculture (CDFA) for use in the production of organic food and fiber.

OMRI® LISTED For Organic Use

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Composition

EcoFungi is a blend of selected strains of *Glomus aggregatum, G. intraradices, G etunicatum* and *G. mosseae*, at a concentration at 100 spores per gram (2835 spores per ounce).

EcoFungi also contains a balanced formulation of free-living microorganisms that act synergistically with the mycorrhizae creating a favorable environment for the plant.

Free-living microbes present in formulation

Bacillus firmus
Bacillus amyloliquefaciens
Bacillus subtilis
Bacillus licheniformis
Bacillus megaterium
Bacillus pumilus
Bacillus azotoformans
Bacillus coagulans
Paenibacillus polymyxa
Paenibacillus durum
Pseudomonas aurofaciens
Pseudomonas fluorescens
Pseudomonas putida
Streptomyces coelicolor
Streptomyces lydicus
Streptomyces griseus
Trichoderma harzianum
Trichoderma reesei
Trichoderma hamatum

Total counts of free-living microbes: $2.8x10^8$ CFU/gr.

EcoFungi needs to be applied so the mycorrhizae spores have direct contact with the roots.

- EcoFungi can be mixed with the seeds before planting
- The roots of plants can be dipped in a solution made with EcoFungi
- EcoFungi can be injected in the soil in proximity to the roots of established plants

Most plants need to be treated only once with EcoFungi throughout their growth cycle. Dosage rates are presented in the following section of this EcoFungi Fact Sheet.

Application rates

Seeds

Treat the seed with 0.45 to 0.9 lbs per acre (0.5 to 1 kg/ha) for grain crops such as alfalfa, corn and wheat. When treating smooth seeds such as corn, we recommend to dissolve EcoFungi in water before being mixed with the seed.

For the treatment of vegetable seeds and potatoes we recommend a dose rate of 0.9 to 1.8 lbs per acre (1 to 2 kg/ha). For fruit and nut tree seeds we recommend a dose rate of 0.2 to 0.5 gr per tree.

Nurseries

Add 0.5 to 1 lbs. per $yard^3$ (300 to 600 grams per cubic meter) of potting soil.

Transplants

Dip roots of plants at a rate of 0.05 to 0.2 gr. per plant. Immerse roots in an EcoFungi solution and plant immediately. Treating the plants in the early stages of root development (3 mm to 1.2 cm root length), or halfway the cycle of cultivation in the nursery maximize colonization and protection

Touch damp roots with the inoculum so a small amount sticks to the roots, or sprinkle into planting holes. Use 1 to 2 grams under each cutting, 5 to 10 grams for potted transplants, 14 grams (½ oz) per inch of stem caliper planting. Working doses in standard plantations of peppers, strawberries and tomatoes are 1.8 lbs/ acre (2 kg/ha).

Established Plants, bushes and trees

Apply 1 to 2 grams of EcoFungi per plant, 3 to 4 gr. per bush, and 4 to 10 gr. per tree. If the soil is porous a solution made with EcoFungi can be poured at the base of the plant. Mix 4 grams per liter (1 tablespoon per gallon), mix well and mist or dip plant root systems during transplanting or water as a soil drench. Fifteen grams in 4 liters (1 tablespoon in one gallon) will treat 50 one-gallon plants. For best results use twice a year. For deeper roots we recommend to inject the EcoFungi solution.

Potted plants

Container size	4 inch	1 gallon	2 gallons	5 gallons	10 gallons
Dose in grams	0.6 to 1.2	1.6 to 2.4	3 to 6	8 to 18	16 to 32

Use lower values for irrigated plants, good soils, small plants, non-stressed environments. Use higher values for drought conditions, poor soils, large plants and stressful environments.

Turf in golf courses and lawns

Apply 1 to 3 pounds of EcoFungi to treat 5000 sqft of porous soil (100 to 300 grams per 100 square meters). Water thoroughly after application. For best results apply twice a year.

Hydroponics

Blend EcoFungi on the root substrate or directly in the nutrient solution.

- Keep pH between 5.5 to 7.5
- Maintain an available P concentration below 70 ppm
- Use aeration system or water circulation as the mycorrhizae are aerobic
- Once the roots have been infected by the mycorrhizae, fertilization can be reduced by 30%
- Best results are obtained with multiple applications throughout the production cycle.
- There is no need to apply EcoFungi once flowering starts.

Recommendations

Avoid using seeds treated with non-compatible fungicides (list below); however, these compounds do not cause significant reduction in mycorhizal infection rate. If an antagonic fungicide is to be applied we recommned to wait until the mycorrhizae has established association with the plant. Foliar systemic fungicides do not cause problem except for those containing triamidefon or Bayleton.

High concentrations of nitrogen and phosphorus inhibit the colonization of roots by mycorrhizae. We recommend to reduce the supply of fertilizers until after the colonization, or to use NPK fertilizers with P lower than 7. Soil concentrations of N and P favorable for mycorrhizal colonization are lower than 110 ppm of N and 80 ppm of P, while optimal concentrations of these elements should be 60 and 50 ppm, respectively.

To avoid retention of EcoFungi the nozzle of the spraying equipment should have orifices bigger than 0.5 mm.

The microbes in ECOFLORA are naturally occurring, and have not been genetically modified. After over two decades of using these strains in the field, we have not seen a single report of adverse effects. However, under certain circumstances such as extreme pH variances (pH<4.5 or >9.5), or other unfavorable soil conditions (previous to planting or caused during crop cycle by other amendments), the effectivity of the microbes may be impaired.

Plants that form association with EcoFungi

Fruits and Nuts

Almond, Apple, Apricot, Avocado, Banana, Blackberry, Cherry, Citrus, Currant, Guava. Grapes (table and wine), Fig, Mango, Papaya, Peach, Peanut, Pineapple, Pistachio, Plum, Raspberry, Strawberry, Walnut.

Grains and Vegetables

Asparagus, Artichoque, Barley, Beans, Carrot, Celery, Corn, Cucumber, Garlic, Grass, Lettuce, Lentil, Millet, Onion, Potato, Pumpkin, Pepper, Tomato, Rice, Soy, Sweet potato, Turf, Wheat, Yam, Yucca,

Flowers and Ornamental

Bamboo, Begonia, Mouths of dragon, Bulbs, Camellia, Cactus, Marigold, Chrysanthemum, Gardenia, Geranium, Sunflower, Fern, Magnolia, Palm, Poinsettia, Rose.

Others

Acacia, Birch, Cocoa, Coconut Palm, Coffee, Cotton, Cypress, Eucalyptus, Fir, Ginger, Hemlock, Maple, Olive, Pecan, Palm of oil, Spruce, Pine, Oak, Sugar cane, Tobacco, Tea.

Some plants do not form association with EcoFungi, such as azalea, carnation, rhododendron, blueberries, orchids and beets.

List of compatible and non-compatible fungicides

Chemical compound (Commercial name)

Compatible	Non compatible
Azoxystrobin (Heritage)	Benodamil (Bayleton)
Boscalid, 3-pyridinecarboxamide,2-chloro-N-(4'-chloro(1,1'-biphenyl)-2-yl) (Endura)	Captan (Captan, Orthocide)
Carboxin + thiram (Vitavax)	
Chloroneb (Terraneb SP, Terremec SP) at low dose	Chloroneb (Terraneb SP, Terremec SP) at high dose
Chlorothalonil (Bravo, Chloroflo, Chlorosip, Chloronil, Daconil 2787, Daconil Ultrex, Daconil Weather Strike, Exothem)	
Copper hydroxide (Kocide)	Copper Oxychloride Sulfate
Cyproconazole (Sentinel)	
Difenoconazole + Metalaxyl (Dividend)	
Dithiocarbamates (Ferbam) at low doses	Dithiocarbamates (Ferbam) at low doses
Ethylenebisdithiocarbamate ion (EBDC) (C4H6N2S4) (Powerline MZ)	Folpet (Phaltan)
Fenarimol (Rubigan)	Formalin (Formaldehyde) Iprodione (Rovral)
Fosethyl-Al (Alliette, Alliete Signature, Prodigy)	Pentchloronitrobenzene (Blocker)
Fludioxonil, 70 - N-[3-(1-methylethoxy) phenyl]-2-(trifluoromethyl) benzamide (Maxim, 4F, Mazim MZ)	
Iprodione (Chipco 26019)	Propiconazole (Banner MAXX, Stratego)
Mancozeb (EBDC) (Manzate, Manzate flowable, Fore, Nubark MZ, Ridomil, Tops MZ, Tops MZ Gaucho)	Quintozene (PCNB Terrachlor, Turfcide) at high rate
Maneb (EBDC) (Maneb, Mancozeb)	
Metalaxiyl-Ridomil (Apron, Subdue Maxx)	
Myclobutanil (Eagle, Rally, Systhane)	
Propanocarb (Banol, Previcur, Proplant)	
Pyraclostrobin (Headline)	

Compatible	Non compatible
Quintozene (PCNB Terrachlor, Turfcide) at low rate	
Tebuconazole (Folicur, Folicur 3.6)	
Tebuconazole + Metalaxyl (Raxil XT) No effect as seed treatment	Tebuconazole + Metalaxyl (Raxil XT) Avoid use as drench
Tebuconazole + Thiram (Raxil Thiram)	Thiazole (Benomyl, Benlate, Tersan 1991)
Thiophanate-methyl / Etridiazole (Clearly's 3336, Fungo, Systec 1998, Banrot)	Triadimefon (Bayleton)
Thiram (Thiram, Tersan 75)	Tilt (CGA65250)
Zinc ethelene bisdithiocarbamate (Dithane)	

List of compatible and non-compatible insecticides Chemical compound (Commercial name)

Compatible	Non compatible
Abamectin (Avid)	Diazinon (Diazinon)
Acephate (Orthene)	Malathion (Savon, Malathion)
Azaterractin (Margoson)	Oxamil
Bendiocarb (Dycarb, Trumpet)	
Bifenthrin (Attain, Talstar)	
Bromo (Agribrom)	
Carbaryl (Sevin)	
Chinomethionat (Morestan)	
Chlopyrifos (Dursban)	
Cyromazine (Citation)	
Dicofol (Kelthane)	
Dienochlor (Pentac)	
Dimethoate (Cygon)	
Fenbutatin (Vendex)	