# Technical sheet of ECOFUNGI

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

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

## 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.

## Composition

EcoFungi is a balanced mixture of selected strains of *Glomus aggregatum, G. intraradices, G etunicatum* and *G. mosseae*, at a concentration at 100 propagules per gram.

EcoFungi also contains a blend 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: $1.28 \times 10^8$ CFU/gr.

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 a solution of water with sugar (10%) or another adherent 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 around 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.

### Turf in golf courses and lawns

Apply 1 pound of EcoFungi to treat 5000 sqft of porous soil (1 gram per square meter). Water thoroughly after application. For best results apply twice a year.

### Hydroponics

Mix mycorrhizae directly with soil-less media or add directly to nutrient solution.

- Maintain pH between 5.5 – 7.5 for best results.
- Maintain P at less than 70 ppm available.
- Use aeration in the system, or ebb and flow, as these organisms are aerobic.
- Once plants are effectively colonized fertility can be reduced 30%.
- Best results are obtained with multiple applications throughout the growth cycle.
- After flowering has begun your mycelial network should already be establish and there is no reason to continue the applications of Mycorrhizal fungi.

## 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.

# 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)<br>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) | |