



EcoFlora

EcoFlora is a complete microbial amendment (bacteria and fungi) that brings life back to impoverished soils and foliage of plants resulting in faster plant development, better growth, vigor and productivity of all crops.

EcoFlora directly provides essential nutrients to the roots and foliage of plants.

The strains of EcoFlora benefit plants by:

- Increasing acquisition of nutrients by fixing nitrogen and solubilizing phosphorus
- Producing active metabolites (phyto-hormones) that stimulate plant growth and productivity
- Improving soil structure that retains nutrients and water
- Promoting plant health by inducing Systemic Resistance
- Producing active metabolites that reduce the stress caused by adverse environmental conditions and deleterious organisms

EcoFlora is 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.



Strain composition

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 microbes: 1×10^9 CFU/gr.

EcoFlora contains a proprietary blend of nutrients for microbes certified as organic by the Organic Materials Review Institute OMRI and the California Department of Food and Agriculture.

Mechanisms of action

Free Living Nitrogen Fixing Bacteria (*Paenibacillus durum*, *P. polymyxa*, *Bacillus azotoformans*)

Convert atmospheric di-nitrogen (N₂) into plant available ammonia (NH₃). Process is mediated by nitrogenase enzyme (secondary metabolite). *Paenibacillus* are mesophilic, facultative anaerobes, function in both aerobic & anaerobic soil environments. *Paenibacillus* form tough endospore covering to protect them against harsh environmental conditions. *Azotobacter* are aerobic organisms which thrive in neutral and alkaline soil environments. *Azotobacter* form protective cysts which mitigate the negative effects of dry soil conditions & UV light.

Phosphate Solubilizing & Phosphate Mineralizing Bacteria (*Bacillus subtilis*, *B. amyloliquefaciens*, *B. firmus*, *B. megaterium*, *P. polymyxa*)

Mineral phosphates (inorganic) are solubilized via organic acids (secondary metabolites) produced by bacteria. Organic acids include gluconic acid, 2-ketogluconic acid, lactic acid, isovaleric acid & acetic acid.

Organic phosphates are mineralized via phosphatase enzymes (secondary metabolites) produced by bacteria. Enzymes include phytase, acid phosphatase, D-glycerophosphatase. Solubilized mineral phosphates are rapidly & efficiently sequestered by endomycorrhizal fungi (synergy). They facilitate root growth, root development, rapid root strike and overall plant establishment as well as enhance the germination process.

Plant Growth Promoting Rhizo-Bacteria (PGPRB) (*Bacillus subtilis*, *B. amyloliquefaciens*, *B. firmus*, *B. licheniformis*, *B. pumilus*, *Paenibacillus polymyxa*)

Gibberellin Production = *B. pumilus*, *B. licheniformis*
Auxin (Indole Acetic Acid) = *B. subtilis*, *B. amyloliquefaciens*, *B. firmus*
Cytokinins = *P. polymyxa*, *B. subtilis*.

Auxins control root architecture, vascular tissue differentiation, lateral root initiation, polar root hair positioning & root gravitropism. Gibberellins control cell elongation, cell division, cell differentiation & stress reduction. Cytokinins control cell division (cytokinesis) in roots & shoots, increased resistance to drought, chlorophyll synthesis. PGPRB promotes plant growth independent of supplemental fertilizer applications.

Rhizo-Bacteria, which Stimulate Induced Systemic Resistance (ISR) (*Bacillus subtilis*, *B. amyloliquefaciens*, *B. pumilus*)

Induced Systemic Resistance results from exposure of plant roots to specific Plant Growth Promoting Rhizo Bacteria (PGPRB). The process is dependent on signaling via the phytohormones jasmonic acid and ethylene, which results in production of phenolic compounds. Essentially biotic stimuli elicits Induced Systemic Resistance response that increases resistance to environmental stress (heat, drought, cold, disease).

Bacteria, Actinobacteria & Fungi Antagonistic To Pathogenic Organisms
(*Streptomyces lydicus*, *S. griseus*, *S. coelicolor*, *Trichoderma hamatum*, *T. reesei*, *Pseudomonas fluorescens*, *P. putida*, *Bacillus subtilis*, *B. pumilus*, *B. licheniformis*)

Release a variety of secondary metabolites which are antagonistic to pathogenic fungi & viruses. Produce antibiotics which inhibit vital cellular functions of pathogens (Protein synthesis, DNA replication, etc). Produce chitinase (breaks down chitin based cell wall of pathogenic fungi). Produce a variety of cell wall degrading enzymes & ethyl acetate to control pathogenic fungi. Control pathogen through inactivation of virulence traits.

Consistency of product composition

Strains present in EcoFlora are maintained cryopreserved at -80 degrees Celsius. The strains are multiplied individually under liquid conditions in aseptic systems that guarantee no contamination. The produced microbes are spray dried under aseptic conditions. The dry strains go through a strict quality control process where presence of contaminants, viable counts and activity are determined. Finally the strains are blended into the formulation to guarantee the composition of each batch.

Application

EcoFlora is a powder that dissolves readily in water, and can be applied directly to the soil or foliage with any type of equipment used for these applications. EcoFlora can be used dry for the preparation of soils or as amendment to planting holes.

EcoFlora should be applied at moments when the plant has the highest nutrient requirements, such as at planting time, three leaves formation, before flowering and during fruit formation. However, continuous applications during the growth cycle have proven most effective. Best results are achieved by dividing the first monthly dose in two applications, applied every two weeks.

Several inoculation methods can be used in a nursery, by themselves or in combination, such as seed treatment, growing media preparation, and periodic drench/spray.

Dose Rates

Seed Treatment

Lay out seeds on waterproof tray. Dampen seeds with water (preferably non-chlorinated). Shake EcoFlora on to dampened seeds. Homogeneously mix water, EcoFlora and seeds until seeds are covered by slurry. Allow slurry to dry thoroughly on seed coat. For optimum results plant seeds immediately after slurry dries. For each pound of seeds add ½ oz of water and 0.16 oz of EcoFlora (1 kg of seed add 33 ml of water and 10 grams of EcoFlora). If you are going to treat the seeds with ECOFUNGI do not treat the seeds with EcoFlora.

Growing Media Amendment

Incorporate 0.55 to 1 oz of EcoFlora per cubic yard of growing media (20 to 37 gr/m³).

Nursery

Apply EcoFlora weekly or every two weeks at a rate of 1.8 oz per 100 square yards (0.61 gr/m²).

Green Houses

Drench plug tray prior to transplant in a 0.1% (W/V) EcoFlora solution in water.

Apply EcoFlora to the soil and foliage after planting by sprinkler system or micro-irrigation at a dilution of 0.01 - 0.05%. Continue applications every two weeks.

When using an injection system, dissolve 0.5 kg EcoFlora (1.20 lbs) in 23 liters of water (6 gallons), shake well. Put the mixture into an injector system at a dilution rate of 1: 100 and apply to foliage or soil. Apply 2,300 liters per 1,000 square meters (600 gallons per 10,000 square feet). This is equivalent to 2.3 L /m², 0.5 gr /m². Apply at planting and repeat according to production cycle every two weeks or every month.

Ornamentals, Row Crops

Apply EcoFlora to soil and foliage at a rate of 4 to 8 oz per acre (280 to 560 gr/ha) every 4 to 6 weeks. For strawberries apply a dose rate of 8 oz per acre (560 gr/ha) every month. For grapes apply a dose rate of 4 to 6 oz per acre (280 to 420 gr/ha) per month. Alternatively, apply product at planting or 3 leaves stage, pre-florescence and pre-fruit formation at a rate of 4 to 10 oz per acre (280 to 700 gr/ha).

Foliar application over the fruits at a 1:5,000 to 1:10,000 dilution will protect them from fungal diseases. Weekly applications of EcoFlora at 2.8 oz/acre (200 gr/ha) will help control plant diseases.

Root crops

In crops such as ginger and turmeric apply EcoFlora to seed, emergence, two weeks and four weeks after planting at a rate between 1.8 to 2.3 oz/acre (124 to 161 gr/ha).

For potatoes apply EcoFlora at planting or 3 leaves stage, pre-florescence and pre-fruit formation at a rate of 4 to 10 oz per acre (280 to 700 gr/ha).

Fruit and nut trees

Apply EcoFlora to soil at a rate of 3 to 5 oz per acre (210 to 350 gr/ha) every month. Apply EcoFlora to foliage at a dilution of 1:5,000 to 1:10,000 prior to flowering and fruit formation.

In case of disease apply EcoFlora every week at a dilution of 1:5000 to 1:10,000. Apply to foliage and/or soil according to the origin of the disease. Weekly applications of EcoFlora at 2.8 oz/acre (200 gr/ha) will help control plant diseases.

Grains

Immerse the seed to be used in an acre in 1.5 oz of EcoFlora (100 gr/ha). Apply EcoFlora to soil and foliage at a rate of 4 to 7 oz per acre (300 to 500 gr/ha) at emergence and pre-florescence.

Flowers

Apply EcoFlora every two weeks at a rate of 8 oz per acre (600 gr/ha).

Weekly applications of EcoFlora at 2.8 oz/acre (200 gr/ha) will help control plant diseases.

For intensive flower production in greenhouses we recommend to 0.9 to 1.3 oz/yd² (0.29 gr/m²).

Golf courses

Dissolve EcoFlora in water and apply at a rate of 0.45 oz per 100 square yards (15 gr/100 m²) of greens or tees, and 0.2 oz per 100 square yards (7 gr/100 m²) of fairways. Apply the product by weekly or monthly.

If bacterial or fungal disease is evident increase the dose rate to 0.9 oz per 100 square yards (30 gr/100 m²), and apply the product every two weeks.

Hydroponic systems

Dissolve monthly 1/4 oz of EcoFlora for every 55 gallons of water in the culture system (3.4 gr/100L).

Recommendations

Flush irrigation systems and sprayers with plenty of water from any pesticide residue before applying EcoFlora. Avoid applying pesticides one week before and one week after applying EcoFlora.

For best results apply foliar applications early in the morning or late in the afternoon.

Keep product dry in an airtight container. Avoid prolonged exposure to direct sunlight.

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.