



## EcoBac Tech Sheet

EcoBac is a liquid bacteria formula that increases growth and production of plants in spite of the presence of a wide array of bacterial and fungal plant pathogens.

Fungal plant pathogens are always present in natural environments; however, these organisms do not grow out of control and decimate the plants. The ecological balance of the natural environment takes care of controlling the proliferation of the plant pathogens. Unfortunately, under intensive monoculture production systems, the use of chemically unbalanced fertilizers and pesticides reduces the microbial diversity and, consequently, allows plant pathogens to proliferate. The microbes in EcoBac cause a shift in the microbial ecology of the environment by diverse mechanisms allowing growth and production of diverse crops at their full genetic potential, even in the presence of fungal plant pathogens.

EcoBac can be applied to the soil with any type of irrigation systems, and to the foliage with any device used for this type of application. Rotation of soil and foliage applications brings ecological stability of soil and foliage.

EcoBac is a blend of selected strains of *Bacillus cereus* (ECO61), *B. cereus* (ECO89), *B. amyloliquefaciens* (ECO72) and *B. subtilis* (ECO71). EcoBac has been patented in the USA under patent number 6,589,524B1.

### The strains of EcoBac

- Produce enzymes (such as chitinase)
- Have active siderophores that sequester minerals essential for pathogenic fungi (Fe in *Fusarium*).
- Produce bioactive metabolites that modify the microbial species composition that colonize the soil and foliage, inducing the establishment of a beneficial biological community for the plant
- Absorb essential nutrients more efficiently than deleterious microbes, thus eliminating them by competition
- Produce vitamins and essential co-factors that stimulate plant defenses and growth.

### Unique product

The strains in EcoBac are naturally occurring, and they have not been genetically modified. The strains are grown individually under a proprietary technology that guarantees no contamination. The spores are blended in balanced proportions and are stabilized with organic polymers resulting in a shelf life of 18 months with no need of refrigeration. We guarantee a minimum spore concentration of  $1 \times 10^{11}$  spores

per liter. EcoBac also contains EcoNutrient, a nutrient formulation that stimulates spore germination, cell proliferation and production of bacterial metabolites required for effective activity. We do not recommend adding any type of carbon source, microbial nutrient or sticker as this might unbalance the system.

Plants can be grown at their full genetic potential when cultured with EcoBac in spite of the presence of the following plant pathogens:

*Botrytis cinerea*

*Botrytis sp.*

*Colletotrichum gloeosporioides*

*Fusarium oxysporium* (ATCC 11711)

*Monilinia sp.*

*Phytophthora cactorum* (ATCC 5800)

*Phytophthora capsici*

*Phytophthora cinnamomi*

*Phytophthora citricola*

*Phytophthora citrophthora*

*Phytophthora nicotianae*

*Phytophthora parasitica*

*Pythium ultimum* (ATCC 56081)

*Rizoctonia solani* (ATCC 38922)

*Sclerotinia sclerotiorum*

*Sclerotium cepivorum*

*Verticillium sp.*

## Plants that benefit from EcoBac

Flowers, vegetables, fruits, grains, trees, palm trees, grasses and turf.

## Application

Apply EcoBac in a scheduled program starting before planting or at planting, and then re-apply periodically. EcoBac acts as a preventive agent. Once plants are infected by systemic fungal diseases it is very difficult to save them.

EcoBac is a liquid product that should be diluted in water and applied to the soil through any irrigation system, and to the foliage with any foliar application system.

Dose rates and application frequency depend on crop, soil type, environmental conditions, and incidence of pathogens.

## Nursery

- Soil preparation. Add 100 to 500 cc of EcoBac diluted in water per cubic meter of soil.
- Seeds. Immerse the seeds in a solution prepared with 5 to 10 ml of EcoBac in 1 liter of water prior to planting.
- Add weekly 25 – 50 ml of EcoBac per cubic meter.

## Greenhouse

- After planting drench the roots or spray the foliage with a 0.1 to 0.4% solution of EcoBac in water.
- Repeat applications at emergence, and weekly during periods of high disease incidence, or by-weekly in periods of low incidence.

## Field crops

- Transplant. Immerse trays with plants before planting to soak the roots in a 0.5% (v/v) solution of EcoBac in water.
- Vegetable and fruit crops. During periods of high disease incidence we recommend weekly foliar or edaphic applications of EcoBac at a dose rate of 2 to 5 L per hectare (0.8 to 2.3 gal/acre) If the period of disease incidence is known, we recommend to starting the applications two to four weeks before the event.
- Flowers. We recommend weekly foliar or edaphic applications of 10 to 20 ml of EcoBac per bed (32 to 38 m<sup>2</sup>) diluted in 10 liters of water.

## Hydroponics

- Add monthly 5 to 10 ml of EcoBac for every 100 L of water in the culture system (0.6 to 1.3 oz per 100 gallons). We recommend foliar weekly or bi-weekly applications of a 0.5% solution of EcoBac in water during periods of high pathogen incidence. During periods of low pathogen incidence as a preventive measure spray a 0.1% EcoBac solution every two to four weeks.

## Post harvest treatment

- Fruits and vegetables can be sprayed or dipped for 5 minutes in a solution made of EcoBac in tap water (0.5 to 1% solution).

## Recommendations

- Purge irrigation systems and sprayers with copious amounts of water to eliminate any pesticide residue before applying EcoBac.
- Avoid applying pesticides one week before and one week after the application of EcoBac.
- Avoid using fungicides such as copper.
- Apply the product early in the morning or at the end of the afternoon.

## Precautions

- Do not drink the product. If ingested, drink plenty of water.
- Use protective gloves and goggles.
- Avoid contact with eyes and open wounds.
- In case of skin contact wash with water and soap.
- In case of spill dilute with water and discard through sewer or over soil.
- Keep bottle capped tightly with the lid.
- Store the product in the shade, at temperatures below 35°C.