



Use and Applications

1. Purpose. To provide information and recommended procedures for the use and application of Bio-Treat.

2. Facts/Discussion.

A. Bio-Treat builds better root systems while delivering nutrients to the plant, in a form it can absorb. Bio-Treat delivers nutrients to plants from fertilizers or otherwise unlocks nutrients bound-up in the soil or growing medium that would otherwise not be available to the plant. From 40 to 60 percent of virtually every plant exists below the ground. Increased top growth is a secondary benefit of building a better foundation for the plant through building a better root system and delivering nutrients right to the roots.

B. Bio-Treat consists of selected viable bacterial spores from families of Plant Growth Promoting Rhizobacteria. It is not a fertilizer but boosts the effectiveness and efficiency of fertilizers. They provide microbes beneficial to plant growth and root development.

C. The microbes were selected from thousands. Only those that had a measurable impact on plant and root growth and more efficient and effective delivery of nutrients to the plant were considered. Additionally, certain exudates of the bacteria are used by the plants in biochemical actions that assist root growth, response to stress and nutrient use. Annuals become larger, sooner than control plants. Perennials develop better root systems with more traveler and feeder roots and become larger and more robust.

D. The product is ideal for use in propagation, greenhouse applications, in the field for both container and in-ground plants and for assisting new transplants to become established more rapidly and for use in plant maintenance.

E. The earlier you begin to treat a plant in its life cycle the better the long-range return will be. Plants benefit from Bio-Treat at any point in its cycle. Bio-Treat does not change the genetic predisposition of a plant, making giants out of dwarfs. It helps nature to optimize growth every season and enables plants to better reach their maximum potential.

F. The bacterial spores become active in the soil, moving from spores to the vegetative state. To achieve this state the spores must have soil ambient temperatures at or above 50°F and available moisture; essentially the same conditions for plant seeds to germinate and begin to grow.

G. The spores remain viable from minus 20 degrees F (-20F) to 130°F. Storage below freezing could cause the water to freeze and expand, rupturing the container. The spore's cell wall remains intact until temperatures below -20. Prolonged storage at and above 135F will eventually sterilize the spores. The bacteria operate in conditions of pH 4.0 through 11.0. They are recommended for use at pH levels of 6.0 through 8.5. pH levels below 3.5 and above 11 can kill the spores.

H. The spore state enables Bio-Treat to be survive most routinely used pesticides, herbicides, and fertilizers that are diluted for application to plants. The product can be mixed into these diluted mixtures for ease of application.

I. Ideally, **Bio-Treat** is applied through drip feed irrigation, drench, or injection directly at the base of the plant. They should be injected downstream from any bacterial or viral filters in the system. The small size of the spores and bacteria, approximately 1 micron by 2 microns, allows the use of screens or gross filters for the removal of debris without removal of the bacteria.

J. The microbes ingest nutrients, moving to populate the root zone of the plant and exude nutrients in a form easily absorbed through the roots of the plants. Plants grow larger and appear healthier because the better root systems enable them to better obtain available moisture and nutrients. The plants receive more of the available nutrients and can absorb them more effectively. Because Bio-Treat acts as a vector delivery system for nutrients, during testing, plants receiving the bacteria have had fertilizer rates reduced as much as 30% still exhibited higher nutrient uptake into the foliage than plants receiving 100% of the recommended fertilizer without the bacteria.

K. Methods of application.

(1) It can be applied through normal spray and drip irrigation systems, as a drench, as an overhead spray or with any application of the previously mentioned products.

(2) If sprayed onto the plants with a foliar spray system it should be followed within a day or two with sufficient water or rain to wash the spores into the soil.

(3) When transplanting, use it in the initial drench and follow-up as part of routine plant maintenance.

(4) If inoculating bare-root plugs or plants, it must be used with some sticking agent or a product such as Terrasorb or Stockosorb, polymer powders that capture and hold water for slow release. Bio-Treat should be added to the mixtures in lieu of the amount of water called for in the product's mixing instructions. (Mix as a thick syrup or light jells.) A quart is enough to inoculate approximately 2000 bare root starter plants.

L. Factors influencing application rates.

(1) Sod is an extremely dense organisms with tremendous numbers of plants per acre. A gallon treats approximately one-half acre. Other plants get one acre per gallon.

(2) Plants typically perform approximately 90% of their feeding in the top 10-12 inches of the rhizosphere; therefore, overall depth of the plant has little impact on the application rate.

(3) When dealing with high-count propagation trays of 200 to 70 cells per tray and with newly planted grass seed or newly placed sod, because of the high density of plants in a small area, the application rate is 6 ounces per 1000 square feet, two gallons per acre. As plants are moved to the field or into individual containers, or the sod becomes established, the maintenance rate is reduced to 3 ounces per 1000 square feet.



(4) A gallon will treat approximately 8,000 plants as seedlings in one-gallon containers. As a practical matter, if using a 3-gallon backpack sprayer, 9 ounces are mixed into 3- gallons and about 600 plants in gallon containers can be treated. As plants move from gallon to 3-gallon, 5-gallon, etc. sized containers, the dosage is adjusted to compensate for the larger root mass and pot volume. 3-gallon - 6,000 plants per gallon, 5-gallon - 2,000 plants

(5) Overhead, area spray needs to be sure the spores are watered into the soil. The rate of a gallon per acre need not be adjusted because of the size of the plants. It is the roots that are being fed. Smaller plants have smaller root systems, more plants per acre. Larger plants have larger root systems and fewer plants to the acre. It is self-regulating.

(6) The bacteria cannot be over applied. Higher doses will not have a detrimental effect on the plant, but it also will not provide a significantly greater benefit.

(7) Because the spores are solid particulate and not a soluble product, the application is given in ounces per square foot of surface area. Also, as the spore changes to the vegetative state it will begin to multiply almost a thousand-fold and is drawn to the roots of the plants by the sucrose the plant exudes through its roots.

M . Application rates.

(1) The recommended application rate for high count propagation is 6 ounces per 1000 square feet of area, for all others it is 3 ounces per 1000 square feet of area, or one gallon per acre, every two weeks. When being applied to concentrated formations of plants, such as in containers adjacent to each other, The product is diluted 400 to one as part of the regular irrigation and watered in.

(2) If feeding is to be spread throughout the two week period, get the first application out in one feeding and then begin to meter it on a continuing basis, dividing the two week dosage by the number of applications and metering that quantity.

N. Plants used for Interiorscapes.

(1) Plants used in the interiorscape market, growing plants used inside commercial or residential buildings, are already subjected to conditions that reduce the normal acquisition and processing of nutrients due to the reduction in photosynthesis.

(2) Furthermore, once inside a building, these plants rarely have ideal watering cycles and suffer dehydration from air conditioning and heating systems.

(3) EPG assists those plants through helping the plant grow better root systems with which to better obtain scarce water and in feeding them by delivering nutrients more efficiently to the root systems in a digested form more easily absorbed than from routine fertigation or feeding of soluble fertilizers.

(4) Growtastic is the key to unlocking nutrients otherwise bound-up and not available for plant use.

(5) Application for Interiorscapes. If unable to feed through a fertigation system, dilute approximately one quart to 50 gallons of water and apply as a drench on a monthly basis or use 3 ounces to a gallon in a sprayer and do a quick spray to the soil around each plant.