

Multi-Care™

Probiotic Soil and Plant Management System

A Bio-Dynamic Liquid Additive for Natural Soil and Plant Management

Technical Manual



For Golf & Landscape

Biofeed Probiotics, Inc.

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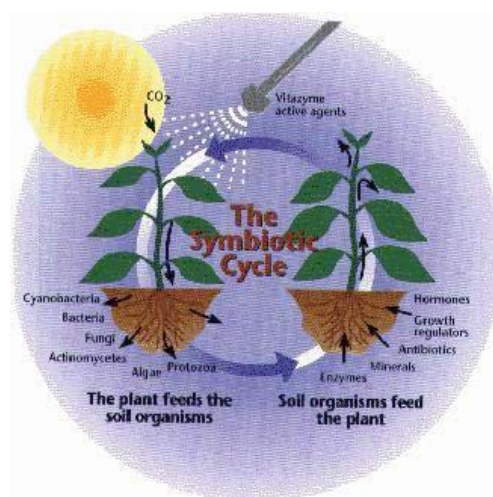
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Dedicated to preserving our environment by renewing the life in our soils and water.

Biofeed Probiotics, Inc.

Presents;

The solution for problematic soil conditions caused by the biological imbalance in our environment.



Today, managing high quality turf is challenging as an array of environmental factors affect soil health and the quality of our irrigation water sources. One major factor is pollution caused by the misuse of chemicals that are designed to make the job of maintaining the landscape easier. The result has often been a biological imbalance leading to diseases in plants and turf and destruction of natural fertility.

Over the years however, science has begun to realize that introducing specific naturally occurring organic compounds into the nutritional program aids in buffering and detoxifying a variety of negative growth factors. These organic compounds include humic acids, enzymes, chelation compounds and biologically secured nutrients that sustain the growth of beneficial microorganisms that destroy or decompose toxins that remain in our environment.

Biofeed Probiotics markets an advanced line of liquid biotech products that solve a variety of problems associated with municipal waste management, landscape, agriculture, aquaculture, and environmental concerns. These bio-product formulas are based on more than 20 years of field research and development, beginning in 1982. These formulations are produced using a balanced combination of biological extracts, including enzymes, intracellular extracts, organic acids, carbohydrates, proteins and nutrients. A variety of component combinations are used to formulate over 12 different probiotic products. The term "probiotic" used herein describes the dynamic growth promoting effects of these products, as opposed to being anti-biotic.

Biofeed Probiotic products work in harmony with nature!

Biofeed Probiotics, Inc. Combines Biotechnology and Innovation to Improve Soil Fertility & Plant Health.

ENZYMES

Enzymes are organic catalysts consisting of complex proteins. They play a vital role in all living organisms. The biochemical reactions that support life are directly assisted by the catalyzing affect of enzymes. Reactions that would otherwise take years to complete occur in mere moments due to enzyme assistance. All plant cells are nourished only by soluble nutrients. This solublizing and chelation of nutrients is accomplished to a great degree by the activity of a variety of enzymes. Enzymes are specific in reaction, for example; Protease is specific for protein, Urease is specific for urea, H₂O-dehydrogenase is specific for hydrogen/oxygen bonds, resulting in the release of elemental oxygen and hydrogen into the soil and water environment.

Biofeed Probiotic products supply essential enzymes to stimulate the metabolic rate of aerobic soil and water borne microorganisms and to improve the mobility of tied-up nutrients, which in turn boost crop production, biological activity and enhance the bio-oxidation and digestion of a wide variety of environmental pollutants.

ORGANIC ACIDS

Organic acids are active components in Biofeed Probiotic products. These acids include humic, fulvic, P~beta hydroxy acid and more than 20 other Di, Mono and Tri carboxylic acids. These acids are derived form natural humic and biological sources and are produced through a series of proprietary submerged culture processes. These organic acids assist a variety of biological reactions such as chelation and solublization of nutrients to improve natural nutrition for biological systems in soils and water. These acids further dissolve mineral nutrients for up-take by plant roots, reducing the need for application of processed plant nutrients.

Various organic acids function as chelating agents. Chelates (key-late) are unique organic molecules comprised of an organic molecular ring structure that can surround individual nutrient ions and anions, resulting in increased biological and plant up-take. These organic acids also act as natural buffers that reduce pressure from mineral salts and assist in detoxifying harmful chemical residues and elemental factors, which may be present in both soils and waters.

BIO-STIMULANTS

A variety of natural bio-stimulants are produced in the metabolic processes of certain bacteria, yeasts, molds and cyanobacteria. These include auxins, gibberellins, cytokynins, florigen, vitamins, hormones, coenzymes and salicylic acids. These promote a variety of essential cellular activities such as root growth, healing process, cell elongation, bud production and fruiting. In soils it has been determined that several of these natural compounds accelerate microbial activity resulting in improved soil fertility and subsequent root and plant growth.

The negative environmental impact caused by pesticides, herbicides, defoliant residue, and the over use or misuse of chemically derived fertilizers has resulted in minimizing the growth and proliferation of beneficial microbial systems in soils which would otherwise naturally produce and supply plants with these much needed biostimulants. Biofeed Probiotic products supply these biostimulants at rates determined by extensive field studies to provide maximum benefit to soil and plant systems.



Turn your soil into a living system of organisms!
Eliminates Black Layer!

Multi-Care™ 3-0-0 Probiotic Soil and Plant Management System

Description:

Soil scientists the world over agree that soils that are *teeming* with microbial activity are more fertile, more productive and support stronger, healthier plant growth. NEW! **Multi-Care™** is a highly concentrated liquid product that activates and supports the growth of beneficial aerobic soil organisms and helps turn soil into a living system of organisms!

Its powerful ingredients both feed and activate beneficial aerobic microbes to build better soil structure, reduce compaction and black layer. Its organic acids also buffer sodium to reduce toxicity.

NEW! **Multi-Care™** also provides a rich source of powerful organic acids that chelate (key-late) soil nutrients for plant uptake. These same organic acids dissolve mineral salts in irrigation pipes and tubing.

Benefits of Use:

- ◆
- ◆ Enzymatically releases oxygen
- ◆ Eliminates Black Layer
- ◆ Soften hard, compacted soil
- ◆ Improve nutrient uptake
- ◆ Improves water penetration and retention
- ◆ Stimulates root growth
- ◆ Reduce disease occurrence
- ◆ Improves drought tolerance
- ◆ Aids seed germination
- ◆ Buffers harmful salts
- ◆ Aids thatch and sludge digestion
- ◆ Reduces odor

University Tests also show that in the plant, NEW! **Multi-Care™** promotes anti-oxidant production; photosynthetic capacity and respiration, resulting in improved drought resistance and deep, dense root growth.

Use NEW! **Multi-Care™** along with your current fertilizer and soil management program to produce healthier turf, trees, flowers, plants and agricultural crops that are more resistant to environmental pressures and disease.

Application Instructions:

Turf and General Use: Apply 4-8 ounces per 1000 square feet or 1-2 gallons per acre every 2-4 weeks. Water thoroughly following treatment.

Fairways; Apply 2-4 quarts per acre every 30 days.

Root Feeding; Add 1 gallons per 100 gallons of root feed solution and inject normally.

Foliar Feeding; Add 1-2 quarts per 100 gallons of water and spray to the point of run-off.

GUARANTEED ANALYSIS:

Total Nitrogen (N).....3-0-0
3% Water Soluble Organic Nitrogen

Derived from Protein Hydrolysate.

Ingredients:

Contains: humic, fulvic and carboxylic acids, natural surfactants, enzymes, vitamins and protein, derived from leonardite and proprietary bio-culture extracts.

Physical Characteristics:

8.9 lbs/gal. pH 8.5

Availability:

2½ gallon jugs, 55-gallon drums or 275-gallon bulk containers.

Condition of Sale:

The information herein is believed to be accurate and reliable. Buyer and user assume all liability from use of this material. Follow directions carefully. Timing, method of application, weather, plant, crop or turf conditions and other factors are beyond the control of the seller.

Storage and Disposal:

Keep products in original container. Do not transfer into food or drink containers. Triple rinse when empty for recycling. Always dispose of container in accordance with local, state, and/or federal regulations.

Caution: Keep out of reach of children. May be harmful if swallowed.

MSDS available upon request. **SHAKE OR STIR AFTER EXTENDED STORAGE.**



BIOLOGICAL CONTROL OF BLACK LAYER WITH NEW! BIOFEED *MULTI-CARE*™

Black Layer is a major problem for golf course managers and landscape professionals around the world that is associated with poor turf grass performance and its identification and prevention is of considerable importance. Black Layer is a black, anoxic and malodorous layer within the root zone that is caused by a lack of oxygen and the subsequent growth of anaerobic microorganisms. Chemically, black layer is a deposit of metal oxides formed from the reduction of sulfur compounds in low oxygen conditions.

Anaerobic or oxygen starved soil conditions normally occur when the soil becomes waterlogged and the movement of oxygen into the soil profile is severely restricted. The diffusion rate of oxygen through water is approximately 10,000 times more limited than through air. Therefore, when soils become waterlogged, diffusion of oxygen into soil pores is severely reduced and soil microbes will rapidly use the available oxygen needed for normal aerobic respiration.



The first indication that black layer is developing is a bad odor similar to that of rotten eggs and further evaluation of the soil profile usually reveals a dark layer has formed 1"-2" below the soil surface.

Delivering oxygen to the root zone is necessary as conditions such as black layer often plague even the best of golf greens. The subsequent odor is caused by the growth or proliferation of anaerobic bacteria such as *desulfovibrio* and *desulfotomaculum* bacteria and/or various blue-green algae or *cyanobacteria*. It is the by-products of these various soil bacteria and the subsequent toxic soil conditions that occur that have a negative impact on root growth. These have also been found to harbor other disease-causing bacteria, further contributing to poor turf health and quality.

In order to produce and maintain high quality greens, tees and fairways, golf industry professionals have been forced to use chemical based nutrients which have been shown to accumulate in soils- especially sandy soils where toxic soil conditions throw off the natural biological balance leading to conditions conducive to the growth of noxious bacteria. Further, the construction of the various layers in artificially prepared soils found in today's golf greens may contribute to the accumulation of chemical residues that cause black-layer causing microbes to grow uncontrollably and create toxic soil conditions.

Biofeed Probiotics, Inc. brings a new approach to improving soil oxygen content. Biofeed *Multi-Care* contains a highly unique enzyme system known as H₂O-Dehydrogenase (HDH). HDH effectively splits the water molecule, releasing elemental oxygen and thereby creates an *aerobic* soil environment that reduces the growth of black layer causing bacteria. This powerful HDH system combined with proper bio-nutrition has proven to be very useful in improving chemical and metabolic oxidation/reduction reactions in soils allowing for improved nutrient up take by plant roots while reducing disease occurrence. ***The solution is HERE!***

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Use NEW! *Multi-Care* on all turf and soil types to eliminate and control Black-Layer!

Dedicated to preserving our environment by renewing the life in our soils and water.

MSDS

MATERIAL SAFETY DATA SHEET

PRODUCT: BIOFEED MULTI-CARE™

1. IDENTITY/ DESCRIPTION

- 1.1 Identity: Multi-Care™
1.2 Manufactured: Biofeed Probiotics, Inc.
1.3 Information: Biofeed Probiotics, Inc. 623-930-7510

2. HAZARDOUS INGREDIENTS/INFORMATION

- 2.1 Hazardous components: NONE
2.3 Chemical Character: Humic Acids, Enzymes, Amino Acids, Biostimulants and Xanthoprotein.

3. PHYSICAL/ CHEMICAL CHARACTERISTICS

- 3.1 Boiling point: 105 degrees C
3.2 Specific Gravity (H₂O= 1): 1.0 g/cm³
3.3 Vapor Pressure: 9 m-bar
3.4 Melting Point: -7 degrees C
3.5 Vapor Density (air= 1): N/A
3.6 Evaporation Rate (BA= 1): N/A
3.7 Solubility in water: Yes, 900 g/l
3.8 Viscosity: 60 m Pa-s (Brookfield)
3.9 Form: Liquid
3.10 Appearance: Brown
3.11 Odor: Nitrogenated Humus Odor
3.12 pH: 8.5

4. FIRE AND EXPLOSION HAZARD DATA

- 4.1 Flash Point: None
4.2 Flammable Limits: None
4.3 LEL: None
4.4 UEL: None
4.5 Extinguishable: Not required
4.6 Special Fire Fighting Procedures: None
4.7 Unusual Fire & Explosion Hazards: None
4.8 Ignition temperature: None
4.9 Hazardous decomposition: None
4.10 Hazardous reactions: None

5. REACTIVITY DATA

- 5.1 Stability: Stable
5.2 Incompatibility: None
5.3 Hazardous decomposition: None
5.4 Hazardous Polymerization: Will not occur

6. HEALTH HAZARD DATA

- 6.1 Route of Entry/ Inhalation: None
6.2 Route of Entry/ Skin: None
6.3 Route of Entry/ Digestion: Potential for mild diarrhea caused by enzymatic action with bacteria in stomach

6.4	Health Hazard (acute & chronic):	Not a hazardous substance
6.5	Carcinogenicity:	N/A
6.6	Signs and Symptoms of exposure:	None
6.7	Medical Conditions Generally Aggravated by Exposure:	Potential for mild diarrhea if taken in concentrate form in quantities greater than 10ml.
6.8	Emergency First Aid Procedures:	Wash eyes out with water for 15 minutes; if swallowed, drink one quart of water to dilute.
7.	PRECAUTIONS FOR SAFE HANDLING, STORAGE, AND USE OF PRODUCT	
7.1	Technical Protection Measures:	No special precautions
7.2	Personal Protection; including breathing, eyes , and hands:	No special precautions
7.3	Fire and Explosion Protection:	No special precautions
7.4	Recommended Storage Conditions:	Store in dry conditions, storage temperatures should be between 10 degrees C and 40 degrees C. Temperatures over 90 degrees C may result in thermal decomposition. Byproducts totally benign; organic matter, water, carbon.
7.5	Precaution in Handling:	No danger from handling packaged material.
7.6	Waste Disposal Method (release of spilled material):	Product is biodegradable. Small spills can be washed away with water. Large spills if uncontaminated, can be returned to container or washed away with water.
8.	CONTROL MEASURES	
8.1	Respiratory Protection:	None required
8.2	Ventilation:	None required
8.3	Protective Gloves:	None required
8.4	Eye Protection:	None required
8.5	Other Protective Clothing:	None required
8.6	Work - Hygienic Practices:	Product is inert in concentrated form. Wash hands after contact with soap and water prior to eating or drinking.