

ASSURE BIO-KELP

Contains Broad Consortium of Free Living Nitrogen Fixing Bacteria

(*P. durum*, *P. polymyxa*, *A. vinelandii*, *A. chroococcum*)

Convert atmospheric di-nitrogen (N₂) into plant available ammonia (NH₃)

Process is mediated by nitrogenase enzyme (secondary metabolite) produced by Paenibacillus

Paenibacillus are mesophilic, facultative anaerobes, function in both aerobic & anaerobic soil environments

Paenibacillus are particularly efficient at colonizing rhizosphere of grass plants

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

Increases availability of nitrogen, promotes greening, reduces the need for supplemental applications of nitrogenous fertilizers

Contains Phosphate Solubilizing & Phosphate Mineralizing Bacteria - Fungi

(*B. subtilis*, *B. amyloliquefaciens*, *B. pasteurii*, *B. firmus*, *B. megaterium*, *P. polymyxa*, *T. harzianum*)

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 & fungi

Enzymes include phytase, acid phosphatase, D-glycerophosphatase

Solubilized (plant available) mineral phosphates are rapidly & efficiently sequestered by plant roots

Promotes rapid root growth, root development, rapid root strike and overall plant establishment

Increases phosphorus availability, promotes root growth, reduces the need for supplemental applications of phosphate fertilizers

Contains Rhizo-Bacteria, which Stimulate Induced Systemic Resistance (ISR)

(*B. subtilis*, *B. amyloliquefaciens*, *B. pumilus*, *B. pasteurii*, *P. aureofaciens*, *P. fluorescens*)

ISR is induced by exposure of plant roots to specific Plant Growth Promoting Rhizo Bacteria (PGPRB)

Process dependent on signaling via phytohormones jasmonic acid and ethylene

Essentially biotic stimuli elicits Induced Systemic Resistance response

Independent of Systemic Acquired Resistance, which is dependent on salicylic acid signaling

Results in increased resistance to abiotic stress such as heat, drought, cold, foot traffic & salinity

Contains Plant Growth Promoting Rhizo-Bacteria (PGPRB)

(*B. subtilis*, *B. amyloliquefaciens*, *B. firmus*, *B. licheniformis*, *B. pumilus*, *P. polymyxa*)

Rhizobacteria produce plant growth promoting compounds such as auxins, cytokinins & gibberellins

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

Promotes turf growth (root & shoot), reduces the need for supplemental fertilizer applications

Contains Cellulase Producing Fungi

(*T. reesei*, *T. harzianum*)

Cellulose is the most abundant organic compound on earth

The enzyme cellulase (secondary metabolite) produced by fungi hydrolyzes cellulose into glucose

Glucose is absorbed by plants and utilized to make polysaccharides their chief structural component

Glucose contributes to carbon cycling in soil and is utilized by beneficial soil organisms as carbon source

Enhances establishment of beneficial organisms in soil profile, provides turf with building blocks for structural integrity

Contains Unique Blend of L - Amino Acids

Unique Blend of Free L – Amino Acids, Derived Entirely From Blended Plant Proteins

Contains Exceptionally High Levels of Two Key Amino Acids (Glutamic Acid & Aspartic Acid)

Specifically Formulated To Enhance Metabolic Processes & Increase Metabolic Efficiencies

Essential for Protein Synthesis (Enzymatic Reactions, Structure, Membrane Transport, Phototropism)

Enhances Photosynthetic Capacity, Increases Chlorophyll Production

Increases Carbohydrate Production (Leaf) & Promotes Storage (Stem Base, Roots, Rhizomes, Stolon)

Regulates Stomatal Function, Promotes Positive Metabolic Balance

Essential for regulating key metabolic processes, maintaining homeostasis & enhancing turf growth

Contains Kelp Bio-Stimulant

- Increased root growth and development, especially feeder roots
- Improves chlorophyll production, enhances and intensifies plant coloration
- Increased tolerance to environmental extremes (heat, cold, drought, foot traffic)
- Enhanced plant growth and development via cell division, accelerates seed germination
- Provides plants & beneficial organisms with essential amino acids, vitamins, enzymes & trace elements
- Promotes enhanced plant growth (root & shoot) & increases tolerance to abiotic stress**

Contains Targeted Microbial Synergists

- Contains broad spectrum of targeted synergists to promote microbial establishment & proliferation in rhizosphere
- Contains multiple targeted carbon sources to optimize growth of each beneficial species in formula
- Contains iron to facilitate ATP production which ultimately drives all metabolic processes
- Contains amino acids to satiate the nitrogenous metabolic requirements of beneficial soil organisms
- Contains brewers yeast extract, provides essential purines, pyrimidines, amino acids, vitamins & minerals
- Essential for meeting increased metabolic requirements of soil organisms during critical lag phase of development**

GUARANTEED ANALYSIS

- Available Phosphate (P₂O₅)..... 3.00%
- Soluble Potash (K₂O).8.00%
- Iron (Fe).1.50%
- Chelated Iron (Fe).....1.50 %

NUTRIENTS DERIVED FROM

Di-potassium Phosphate, Kelp (*Ascopyllum nodosum*), Ferric Ammonium Citrate

ALSO CONTAINS NON-PLANT FOOD INGREDIENTS

- Paenibacillus polymyxa 600,000,000 CFU per gram, Paenibacillus durum 600,000,000 CFU per gram,
- Bacillus subtilis 125,000,000 CFU per gram, Bacillus firmus 125,000,000 CFU per gram,
- Bacillus amyloliquefaciens 125,000,000 CFU per gram,, Bacillus licheniformis 125,000,000 CFU per gram
- Bacillus megaterium 125,000,000 CFU per gram, Bacillus pumulis 125,000,000 CFU per gram,
- Bacillus azotoformans 125,000,000 CFU per gram, Bacillus pasteurii 125,000,000 CFU per gram,
- Pseudomonas aureofaciens 25,000,000 CFU per gram, Pseudomonas fluorescens 25,000,000 CFU per gram
- Streptomyces lydicus 25,000,000 CFU per gram, Streptomyces griseus 25,000,000 CFU per gram,
- Trichoderma reesei 25,000,000 CFU per gram, Trichoderma harzianum 25,000,000 CFU per gram,
- Azotobacter vinelandii 25,000,000 CFU per gram, Azotobacte chroococcum 25,000,000 CFU per gram
- 41.00 % Dextrose, 9.00 % Sucrose, 5.00 % Amino Acids ((L-Alanine, L-Argine, L-Aspartic Acid, L-Cystine, L-Glutamic Acid, L-Glycine, L-Histidine, L-Isoleucine, L-Leucine, L-Lysine, L-Methionine, L-Phenylalanine, L-Proline, L-Threonine, L-Serine, L-Tryptophan, L-Tyrosine, L-Valine), 2.00 % Maltodextrin, 1.00 % Brewers Yeast Extract

APPLICATION RATES

APPLICATION	AMOUNT	COVERAGE	FREQUENCY - TIMING
Cool Season Turfgrass Maintenance	1 oz	1000 sq ft	4 times per growing season
Warm Season Turfgrass Maintenance	1 oz	1000 sq ft	6 times per growing season
Grow In, Renovation, Over-seeding	2 oz	1000 sq ft	At time of seeding, 3 applications 4 weeks apart

- * Formula is 97 % water soluble by weight, product should be stored in a cool, dry area out of direct sunlight.
- * Contains hygroscopic ingredients protect from moisture & humidity
- * Keep container sealed, when stored properly products has 24 month shelf life
- * When applying product mixture to soil be sure to utilize an adequate volume of water to achieve desired coverage.



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