

# Suståne®

Natural Fertilizers & Soil Builders

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Fertility Specifications for

## Erosion Control & Bioremediation

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for Environmentally Sensitive Areas



# Sustâne® Natural Fertilizers & Soil Builders

for Vegetative Establishment, Erosion Control and Bioremediation

- Sustâne Organic Compost-Based Granulated Slow Release Nitrogen  
AND
- Sustâne Humates, Humic Acid, Mycorrhizae and Microbial Stimulants  
PROVIDES
- The Total Package for Ensuring Rapid Plant Establishment with  
Long Lasting Natural Cycling of Soil Fertility

## Sustâne Natural Fertilizers & Soil Builders:

Produces rapid plant establishment with long lasting fertility, reducing the need for repeat applications.

Manufactured from recycled, renewable agricultural materials and naturally occurring minerals.

Low environmental impact. No leaching, runoff or volatilization. Cost effective fertilization.

Total plant nutrition, contains all elements essential for plant photosynthesis.

Rich in humic substances and high in microbial diversity help build and hold in place erosive soils.

Tested and developed for varied climates and ecosystems since 1988. Made in America... Used Worldwide.

## Sustâne is aerobic compost concentrated.

The end result of controlled aerobic (in the presence of oxygen) decomposition of organic matter is compost. All Sustâne fertilizers are built on a base of aerobically composted turkey litter over a 26-week stabilization process. Organic matter has been transformed into uniform humus. Soluble nitrogen has been converted to water insoluble slow release nitrogen (SRN) that will not burn plants, leach into the soil as nitrates or volatilize into the atmosphere. The end product is safe to use, easy to apply and predictable in plant growth response. Sustâne compost is blended with natural minerals, sometimes additional humates and can be supplemented with beneficial mycorrhizae. After dehydration and granulation, Sustâne becomes compost concentrated - economical to transport and simple to apply at agronomic rates. Nutrient levels are guaranteed. Soil physical structure is improved by the addition of glomalin and humic substances. Biological activity has been restored to damaged or inert soils. Sustâne is universally used in landscaping, horticulture, and turf maintenance, vegetative establishment for erosion control, land reclamation, wetland construction and bioremediation of worn out and damaged soils.





# Sustâne® Natural Fertilizers & Soil Builders

## Rationale for Quality Organics in Revegetation of Natural Areas



**Sustâne Natural Fertilizers are specified for revegetation work in all climatic zones. These are the reasons why:**

### **Enhanced Environment - Rapid Plant Establishment**

- Sustâne promotes a rapid rate of native plants, grasses, and forbs establishment. Quick ground cover minimizes soil erosion, the need for repairs and re-seeding and the time required to achieve soil stabilization.

### **Low Environmental Impact Organic Based Fertilizer**

- Organic nitrogen is released slowly to the plant, minimizing loss to the environment.
- The longer N-release reduces energy requirements and labor vs. more applications of water-soluble synthetic fertilizers.
- Sustâne stimulates the natural cycling of nutrients and carbon between soil and plant.
- Sustâne reduces need for pesticides. Less pesticides reduce maintenance costs.
- Sustâne is biologically stable, pathogen free, will not reheat, will not combust, does not attract wild or domestic animals or birds or insects to establishment sites.

### **Low Carbon Footprint using Renewable Resources**

- Made from natural renewable agricultural resources, has a low carbon & green house gasses (GHG) footprint.
- Sustâne complies with regulatory mandate and exceeds most health & safety standards.
- The Sustâne process avoids the generation of more significant green house gasses such as methane and nitrous oxide.

### **Reduced Energy Required for Transport and Application**

- With Sustâne the energy required to transport is reduce 4:1 per kg. vs. wet compost.
- Granulation simplifies handling allowing more accurate application of fertilizer. The product stays where it was applied.

## **Introduction to Natural Plant Establishment**

As world demand for restoration of disturbed soil sites and the development of natural recreational areas increases, architects, planners and regulatory authorities look for design, inputs and management practices that will produce the best possible product with the lowest environmental impact. Today we now recognize and understand that the Environment is impacted - either positively or negatively - not only by inputs and management practices at the project location, but also at the source of manufacturing of the inputs selected. We all live in One World and it truly is a global community. How we manage our resources and manufacturing technologies in one part of the world, ultimately affects all other neighbors in the global community in one way or another.

Over 20 years ago Sustâne was founded first on the basic premise of utilizing and refining renewable agricultural resources that if poorly managed, might otherwise contribute to environmental issues that would require future generations to work harder to clean up. In the 1980's Sustâne and the U.S. Environmental Protection Agency established new safeguards and techniques for recycling and redistribution of natural resources in the most environmentally benign way possible. The "Sustâne" process became a consciously systematic way to better manage plant materials and agriculture's rotation in the Nature's carbon cycle. The Sustâne composting and manufacturing process avoids production of serious greenhouse gasses like methane and nitrous oxide; and, utilizing Sustâne products serve to augment native, ornamental, and agricultural crops' capacity to naturally sequester and clean CO<sub>2</sub> from our atmosphere.

The resulting green product - the restored mine site, the new Green Roof, the highway right-of-way, the new landscape, the renovated sports pitch, the expanded park or newly opened golf course - ultimately grows into a verdant open space for all to enjoy and for generations to come. Over 20 years of applied research on Sustâne natural fertilizers at over 100 universities and research facilities around the world have helped better define and understand how a new generation of organic and organic based fertilizers perform best in the growing zone; and serve to minimize any negative impact on our natural environment. It is our job and our responsibility to ensure that what we create and restore today is not only long lasting, beautiful to observe and enjoyable for all to experience ...but also leaves our environment in a clean, safe and sustainable place for future generations to come.





# Sustâne® Natural Fertilizers & Soil Builders

## Organic-Based Fertilizers for Revegetation of Natural Areas

Sustâne Natural Fertilizers are manufactured from renewable resources and distributed to over 50 countries worldwide. Since 1988 Sustâne has established the standard in natural and organic fertilizers for product quality, testing, research and development. With over 400 research papers and articles to its credit Sustâne is known to be the most predictable, safe and effective organic on the planet.



**Hydroseeding beach dunes for stabilization after Hurricane Katrina 2005 Galveston Island, Texas.**

Derived from truly aerobically composted turkey litter, turned into homogenous and stable humus over a 26-week composting process. Sustâne Organic fertilizers include all primary, secondary and micronutrients held in an organically chelated humus-rich base.

**Sustâne 3•4•2** Basic Sustâne all-organic granulated compost provides maximum humus and all essential nutrients. Can be used as a stand-alone or as a blending base with NPK.

**Sustâne 4•6•4** Standard all-organic vegetation starter in low P soils. Used in erosion control, wetlands and burn area re-establishment, mine site reclamation, oil and gas site remediation and highway roadside plant establishment.

**4•6•4 + Humates** Standard Sustâne 4-6-4 with 7% extra humates added from naturally occurring unaltered oxidized lignite with 70% Humic Acid concentration.

**Sustâne 5•2•4** All-organic 2.5:1:2 NPK ratio for vegetative maintenance, turf, shrubs and trees.

**Sustâne 8•2•4** Sustâne's Highest all-organic nitrogen formula. 90% slow release nitrogen, low P Concentration. Used where steep terrain or limited equipment access dictates.

**Custom Blends** Custom blends and special formulae are available. Sustâne can alter or supplement a wide range of custom formulae specific to job sites and project specifications including additional humates, mycorrhizae, alternate macro and micronutrients. Please contact Sustâne or your regional representative.

### Sustâne Organic Fertilizer Application Guidelines for Erosion Control and Vegetative Establishment

<b>Sustâne 4-6-4</b>	Application Threshold	Rate lb. Product Per acre	Organic N Per Acre 4%	Organic P <sub>2</sub> O <sub>5</sub> Per Acre 6%	K <sub>2</sub> O Per Acre 4%	Calcium Per Acre 4%	Sulfur Per Acre 2%	Magnesium Per Acre 0.65%
	Optimal	3600	144	216	144	144	72	23
	Moderate	2200	88	132	88	88	44	14
	Minimum	1100	44	66	44	44	22	7
<b>Sustâne 8-2-4</b>	Application Threshold	Rate lb. Per acre	Organic N 8%	Organic P <sub>2</sub> O <sub>5</sub> 2%	K <sub>2</sub> O 4%	Calcium 2%	Sulfur 1.5%	Magnesium 0.37%
	Optimal	2250	180	45	90	45	34	8
	Moderate	1250	100	25	50	25	19	5
	Minimum	620	50	12	25	12	9	2

# Sustane® Natural Fertilizers & Soil Builders

## Organic-Based Fertilizers for Revegetation of Natural Areas

### Typical Secondary and Trace Elements in Sustane Fertilizer Products

*Including pH, carbon:nitrogen ratios, humic acid and salt index.*

	All Natural Fertilizers				Natural Base Fertilizers <sup>3</sup>			Specialty Products	
	NOP <sup>1</sup>	OMRI Listed Allowed <sup>2</sup>			Sustane Fertilizers			BOLSTER G	BOLSTER L
Sustane Product	2-3-3 %	4-6-4 %	5-2-4 %	8-2-4 %	5-2-4+Fe %	5-2-10+Fe %	18-1-8+Fe %	4-4-4+3Fe %	0-0-0 %
Sulfur	2.06	2.28	2.24	1.75	4.66	6.50	7.50	3.15	2.00
Magnesium	0.79	0.65	0.57	0.37	0.55	0.42	0.46	0.88	0.00
Calcium	3.94	4.65	2.83	2.20	2.81	2.05	2.20	4.12	0.00
Sodium	0.33	0.46	0.31	0.44	0.30	0.25	0.34	0.46	0.00
Iron	1.20	0.50	0.50	0.27	2.30	2.30	1.42	3.5	5.00
Aluminum	0.21	0.22	0.21	N.A.	0.16	0.15	0.01	N.A.	0.00
Manganese	0.06	0.05	0.05	0.03	0.05	0.04	0.03	0.08	0.00
Copper	0.02	0.02	0.02	0.03	0.01	0.01	0.01	0.06	0.00
Zinc	0.05	0.02	0.02	0.03	0.01	0.01	0.01	0.04	0.00
Humic Acid	5.50	7.80	8.82	9.16	2.16	3.75	3.83	6.06	4.00
pH	6.50	6.40	6.60	6.70	6.60	6.30	6.10	6.40	6.5
Total Carbon	32.0	27.2	30.0	31.3	25.0	20.3	19.5	20.8	N.A.
Carbon:Nitrogen	12.8	6.80	6.10	3.91	5.02	4.06	1.08	7.6	N.A.
Salt Index	3	5	6	11	14	27	26	11	N.A.

(1) USDA National Organic Program compost standards (2) Allowed for use in organic production by the Organic Materials Review Institute.  
 (3) Natural base fertilizer as defined by AAPFCO, mass and NPK is greater than 50% organic and natural materials.

#### Land Application Methods

1. Sustane organic fertilizers can be applied dry broadcast and shallow soil-incorporated prior to seeding;
2. Tank mixed with water, seed, tackifier and hydro-mulch for hydraulic seeding applications; or
3. Top-dressed with rotary broadcast applicator for post plant fertilization.

#### Humic Substances in Sustane

Sustane organic fertilizers provide natural sources of humates and humic substances formed during the Sustane aerobic composting and manufacturing process. Humic acid levels range from 7 - 9% in Sustane 4-6-4 and 8-2-4. One ton of Sustane applied per acre provides approximately 160 lb. humic acid per acre and additional humic substances.

#### Sustane Contains All Elements Essential for Plant Photosynthesis:

In addition to carbon, oxygen, and hydrogen there are 13 other elements known to be essential for plant photosynthesis to occur. Different plants have different nutritional requirements. Nitrogen (N), phosphorous (P) and potassium (K) are the three other elements that plants require in the greatest quantity; hence they are identified as the primary nutrients. Secondary elements are often required in larger doses, and tertiary or "trace" elements also referred to, as micronutrients are required in minute or "trace" amounts by plants.

#### Typical Secondary and Tertiary Elements in Sustane Fertilizers:

The values shown in the chart above are average values from analyses of multiple samples over many years.

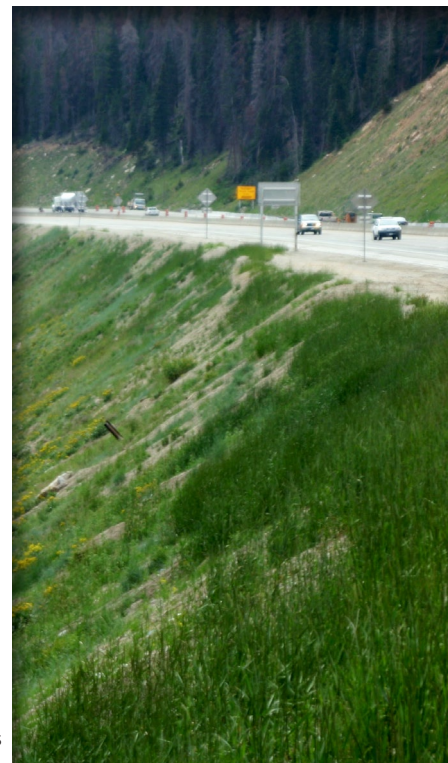
#### Benefits to plants and soils fertilized with Sustane:

The absence of essential nutrients is a growth-limiting factor. Soil micronutrient levels also affect soil microbiology and plant productivity. Supplying secondary and micronutrients is critical to plant health and soil productivity. Supplying small doses of secondary and tertiary nutrients (along with N, P and K) to crops and soils can provide both short and long-term benefits.

**Humic Acid (H.A.)** is a component of humus, the end product of decomposition of organic materials. Humus and its constituents, humic acid, fulvic acid, and humin "have the greatest single influence on all physical, chemical, and biological aspects of our spaceship earth." [from "Humic, Fulvic and Microbial Balance - Organic Soil Conditioning", William R. Jackson, PhD.] H.A., which is soluble in dilute alkaline solution, and precipitated in a weak acid solution, is made of complex, long chain molecular structures comprised of carbon, hydrogen, nitrogen, oxygen and sulfur.

**ORGANIC MATTER - AN IMPORTANT NOTE:** It is the quality of the organic matter present in a soil or in an organic fertilizer that is most important, not the total quantity of organic matter. Raw manures (dehydrated or not) plant materials like straw, leaf mulch or wood fiber, animal meal and plant protein based "organic" fertilizers will oftentimes test higher quantity in total organic matter than does Sustane. Sustane has undergone thorough, aerobic composting, or humification before further processing. Organic matter must first be decomposed before soil microorganisms can release plant nutrients from organic fertilizers. This process requires large quantities of oxygen. The decomposition process creates biological oxygen demand (B.O.D.). In other words, soil microorganisms and plants require - or demand, an ample supply of oxygen to support healthy plant growth. Sustane does not take oxygen from the rhizosphere. The nutrients and humus are immediately available to soil microorganisms. Sustane does not "tie up" or immobilize soil nitrogen by causing soil microbes to first digest raw organic matter.

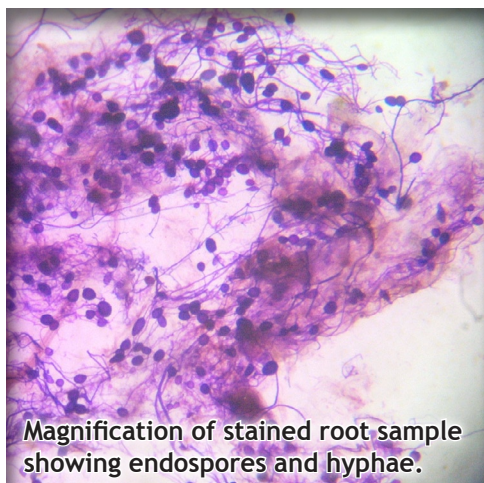
**Always remember that rule of the jungle is that soil microbes eat first, before the plants are fed.** That is their job and it is an important one. The application of raw organic matter to soils establishes a competition for oxygen between plant roots and soil microbes - and the microbes always win, often at the expense of supplying nutrients or available oxygen to the plants.





# Sustane® Natural Fertilizers & Soil Builders

## Biostimulants & Mycorrhizae for Revegetation of Natural Areas



Magnification of stained root sample showing endospores and hyphae.

### Sustane Arbuscular Mycorrhizal Inoculant - Granular

The use of mycorrhizal fungi is used to treat disturbed soils that have been depleted of beneficial microorganisms. Mycorrhizae are major facilitators in soil microbiological processes. The addition of mycorrhizal inoculants has a positive effect on microbial populations by providing an environment for organisms that aggregate the soil, convert matter to available plant nutrients and suppress pathogens, which are generally present in higher populations when mycorrhizae are not present and when soils are compacted and anaerobic.

**Background on Mycorrhizal Fungi:** Mycorrhizal fungi are living organisms that provide several benefits for their host plant. These organisms are entirely dependent upon their symbiotic relationship with plants for survival and consequently provide a number of services and materials to assure their host plant's survival and productivity.

**Sustane utilizes four species** selected for wide range of ecosystems and climates: Glomus Intraradices, G. Etunicatum, G. Deserticola, and G. Clarum. Sustane guarantees 120 propagules per cubic centimeter. Mycorrhizae are available from Sustane in 11 lb. and 40 lb. bags or custom blended into Sustane fertilizers.

Recommended application rate is 60 lb. per acre applied with hydroseed or seed drill.

### Key Benefits of Sustane mycorrhizae:

- 1. Efficient use of water and plant nutrients:** Upon colonization of the host plant, mycorrhizae begin to significantly increase the plant's access to the soil resource pool by extending (literally miles of additional) microfilaments known as hyphae throughout the rhizosphere (root zone). These threadlike structures extract both soil moisture and plant nutrients from an enlarged area and from minute sites that are inaccessible to bare roots drawing water and nutrients from a volume of soil that is 40 to 50 times greater than what the plant alone can access.
- 2. Enhanced Plant Immune and Defense System:** Mycorrhizae provide access to soil nutrients such as phosphorous, calcium, sulfur, ammoniacal nitrogen and zinc. These specific plant nutrients are key to the plant's formation of immuno-defense compounds such as alkaloids, terpenes, phenols, and flavinoids. When these compounds are present at sufficient levels in a plant it has the capacity to fend off pests and pathogens.
- 3. Improved Soil Structure:** As mycorrhizal hyphae develop they excrete a glue-like substance called "glomalin". Glomalin is an important substance found in well-aggregated soils that creates additional porosity, which allows for increased movement of air, water and beneficial soil organisms throughout the soil profile. Many of the common root pathogens actually prefer waterlogged and compacted soils (anaerobic conditions). Conversely, an oxygen-rich (aerobic) soil environment created by well aggregated soils favors many of the beneficial microorganisms that assist plants in soil mineralization (of plant nutrients) and help in the suppression of plant and soil pathogens.



### BOLSTER® BIOSTIMULANT

A concentrated plant growth supplement specifically developed to prepare plants for improved growth in sub-optimum and stress conditions. BOLSTER is a scientifically balanced formulation of cold processed seaweed extracts,

humic acid and plant nutrients, which provide optimum growth potential. Seaweed extract from Ascophyllum nodosum is an excellent source of auxin, cytokinin and gibberellin hormones and trace minerals. These hormones are combined with humic extracts from Leonardite and a specially chelated iron that is readily available. BOLSTER's performance is proven in over four years of field research and university testing. Available in 2 x 2.5-gallon and 55-gallon drums. Apply with hydroseed at 1 - 2 gallons per acre.



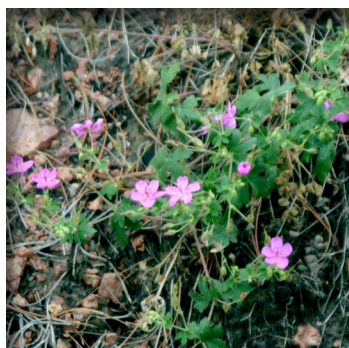
### BOLSTER GRANULAR™ 4•4•4+3Fe with VA Mycorrhizae

BOLSTER GRANULAR contains a powerful, synergistic blend of mycorrhizae, growth factors and plant biostimulants proven to promote rapid root development, superior growth and protect roots from drought, stress, transplant shock, pathogens and soil contaminants. BOLSTER prepares plants for

stress conditions, increasing root mass and depth without a flush of top growth. BOLSTER has demonstrated improved drought resistance, increased chlorophyll production and delayed senescence. It also increases plant salt tolerance in saline soils and irrigation water high in salts; increases plant health and vigor to offset infection of certain diseases and to guard against affects of plant parasitic nematodes. Available in 50-lb. bags and 1-ton totes. Apply at 1,100 - 2,200 lb. per acre.

# Suståne® Natural Fertilizers & Soil Builders

Provide Microbial Diversity for Revegetation of Natural Areas



**Microbial Diversity** refers to breadth or range of microorganisms present in an ecosystem. Soil microbiology is so instrumental in many soil and plant functions that its importance to healthy plant establishment, erosion control and bioremediation cannot be overemphasized. Suståne, true aerobic compost contributes so much more than plant nutrition and humus - it sets the stage for expanding microbial diversity in weathered and eroded soils. Microbiologists and ecologists refer to these positive changes as enhancing “species richness diversity” (SRD). SRD is a measurement of diversity that indicates the number of different types of microorganisms present in a sample of soil or compost.

## Why Microbial Diversity is Important:

In soil or compost, high species richness diversity promotes interspecies relationships and inter-population interactions.

Species diversity allows more varied and flexible response to environmental changes.

More diverse microbial communities can better cope with disturbance and stress than can low diversity soils.

Diversity indexes can be used to compare and evaluate different sources of microbial products. Total richness diversity index is useful for comparisons of similar soil or compost samples.



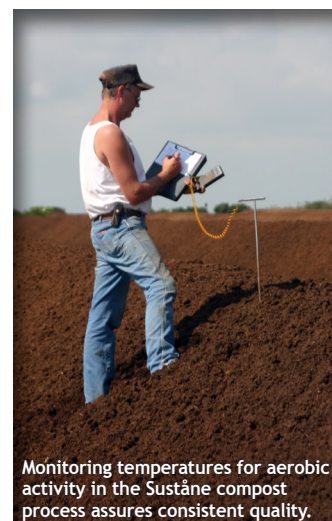
***“Suståne compost-based natural fertilizers provide one of the most biologically diverse and microbially beneficial amendments for improving, rebuilding and remediation of erosive soils that are sterile, dead or lacking in good physical structure and biological activity. Suståne is proven to be disease suppressive, improves soil nutrient cycling and stabilization of soil aggregates. And best of all, the product establishes a long-lasting soil-plant-microbial interaction that helps propel the natural cycles of soil building.”***

## SUSTÅNE COMPOST ANALYSIS

PARAMETER	SUSTÅNE COMPOST ENUMERATION	SUSTÅNE DIVERSITY (SRD) INDEX	EXAMPLE MODERATE DIVERSITY (SRD) INDEX
Aerobic Heterotrophic	$5.9 \times 10^9$ CFU /gdw*	2.0	1.6
Anaerobic Bacteria	$8.7 \times 10^7$ CFU / gdw	0.9	0.8
Yeasts and Molds	$2.7 \times 10^5$ CFU / gdw	0.4	0.8
Actinomycetes	$5.0 \times 10^3$ CFU / gdw	0.8	0.9
Pseudomonads	$8.5 \times 10^8$ CFU / gdw	0.7	0.5
Nitrogen-Fixing Bacteria	$1.0 \times 10^3$ CFU / gdw	-0.3	0.3
Total Species Richness Diversity Index (SRDI)		4.5	4.9

Richness, ecologically speaking, is the quantity of different species present. The Diversity value is an index number relative to the richness and the quantity of the CFU's/gdw.

All data from BBC Laboratories, Inc., Tempe, AZ June 2002.



Monitoring temperatures for aerobic activity in the Suståne compost process assures consistent quality.



# Quality Growth Through Healthy Soil.™



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