

Wonder Soil

Expanding Mixes and Mulches

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CEO



Ingredient Study 2013

INGREDIENTS FOR CUSTOM MIXES

Any of the ingredients below can be selected and used in custom mixes

WONDER SOIL INGREDIENTS IN STOCK

All custom formulations are available in any of our 7 wafer sizes and as reground pellets

WASHED COIR

BUFFERED COIR

ALASKAN HUMMUS

MANAFEE HUMMATE

BLACK WORM CASTINGS

RED WORM CASTINGS

COMPOST ORGANICS

MYCORRHIZAE / AZOS

CHICKITY DOO DOO

SEABIRD GUANA

BAT GUANA

BIOSOL

TRICHADERMA

RAINBOW GROW

RAINBOW BLOOM

MICRO NUTRIENTS

Dr. EARTH

ORGANIC MIXED RELEASE FERTILIZER

COMBO SLOW & QUICK RELEASE FERTILIZERS

SUPER FOOD PLANT TAB TEA

POLYMERS

PUMICE

VERMICULITE

PHOSPHATE

GREEN SAND

GYP SUM

DOLOMITE LIME

HYDRATED LIME

COPPER

YUCCA

OASIS



COCONUT COIR

Coconut coir composes the bulk of Wonder Soil's physical substance and volume. It is, along with the acrylate polymers, one of the keys to Wonder Soil's vast water absorbing and retentive abilities. Coconut coir is used in both our expanding growing mediums and in our coir planting pots, which are 100% biodegradable and can be transplanted directly without the risk of root shock.

Coco coir is the fiber that results from the processing of coconuts (the removal of the "nut" from its fibrous encasing). The coir fiber is a by-product of an existing process and is quite renewable when compared to peat moss sources. The fiber is arguably more bio-active than peat fibers resulting from bog conditions. The coconut, as we know it from the grocer's, is surrounded by tough fibers in a green casing where it is attached to the tops of coconut trees swaying in the breeze in tropical conditions. The coconut tree is a well-adapted plant, in its ability to populate an area through the "seed"; the coconut. As the coconut matures on the tree, it breaks free and may fall a considerable distance. It may roll down an elevation before coming to rest, or it may become water borne and float for many months and wash up far from its origin. In any case, the coconut is able to germinate and root itself in sandy and often saline (salty) conditions miles away from its parent conditions. This makes the coconut a 6 to 8" high octane seed. As a matter of fact, sterilized coconut milk is often added to the growing media as a source of hormones and nutrients in plant tissue culture.

The coconut is teaming with naturally occurring growth hormones and other bio-stimulants that are inherent to the survival of the species, which fortunately for growers may be found in the fibers surrounding the "seed" which may be processed for use as a growing medium. As with peat, there are factors affecting the quality of use of the coir as a growing medium. The origin and age of the parent material largely plays a role in the fiber qualities. Coconuts harvested when fully mature contain more lignin and cellulose. These fibers are tough and durable enough to manufacture rope from. Interestingly, coconut fiber is the only natural fiber resistant to breaking down in salt water. This helps make it ideal for indoor gardeners, as nutrient solutions, particularly popular inorganic varieties and the salts they contain, play a role in the erosion of growing medias over the course of the crop.

While coir is an essential ingredient in Wonder Soil and facilitates water absorption and retention, it is Wonder Soil's thoroughly tested and immensely effective repertoire of nutrients that makes plants grow faster than they ever could in traditional soil. The plant on the left has been grown in Wonder Soil while the plant on the right has been grown in pure coir. Since it is not being fed Wonder Soil's superb nutrient mix, it's growth rate is exponentially longer and disappointing.



Coconut coir that is optimal for plant growth also tends to be near neutral in pH (7.0). This helps ensure proper ionic balances in nutrient solutions. The compressed form of coir requires hydrating. The dried and compressed blocks are much easier to transport to and inside of the growing location.

Coir is the ideal growing media for organic and hydro-organic applications. The air volume retained harbors greater populations of beneficial (oxygen loving) soil organisms than peat mixes. Increased population levels of soil micro-organisms play a strong role in high yielding organic gardens. One of the most impressive attributes of coconut coir as a growing medium is the level of aeration and structure supplied to the root zone. The coconut fibers are much tougher and coarser than those of peat. This means more airspace is available for drainage and to supply the roots and soil life with higher levels of atmospheric oxygen (O₂). Coir fiber will not compact over the course of the crop as with peat.

Unlike peat, coir may be used in re-circulating applications. In re-circulating drip systems it is recommended that the fiber be mixed 50/50 with either coarse perlite, pumice or grow rocks for faster drainage. Coir is also very suitable for flood and drain applications. Coir products are now available in the hydroponic marketplace and are excellent substitutes growing mediums. One such product is a small, plastic wrapped square of compressed coco coir. Once hydrated, it expands into a 6" X 6" X 6" growing cube. Moisture management may differ from other media. Another benefit is that coco tends to have a near neutral pH value, so lesser quantities of pH adjusters are required in the nutrient solution. Excessive additions of pH adjusters may create an ionic imbalance in the nutrient solution, locking out or precipitating some nutrients.

One of the greatest benefits to using coco products is that disposal is easy and environmentally sound. The coir makes an excellent and natural looking top dressing to outdoor flower and vegetable gardens.



Wonder Soil's coir pots allow for easy planting and effortless transplanting Without the risk of root shock. Notice how these coir planting pots naturally Biodegrade, allowing the roots of the plant to break through the bottom.



CASCADE MINERALS

Manufactured from Volcanic Basalt Rock, Cascade Minerals mills these stones to produce a finely processed product for use as a soil amendment. Volcanic Basalt Rock, finely ground, mimics the slow process of the earth's own method for producing healthy soil by releasing essential minerals and nutrients that your plant needs to flourish. As your soils are continually used the available minerals can become depleted resulting in your plants having to fight harder to maintain optimal vitality and maximum potential. Cascade Minerals can aid in the regeneration of your soils and work to kick-start the biological processes required for optimal plant growth.

- Provides slow natural release of minerals and trace elements
- Non-toxic, environmentally friendly and completely 100% natural
- Great for compost - Increases biotic-mineral content of humus and reduces smell
- Increases both growth rate of micro-organisms and earthworm activity
- Increases yields
- Produces more nutritious crops.
- Improves water retention in coarse textured soils and potting mixtures

Calcium (Ca) 1%, Magnesium (Mg) 0.5%, Manganese (Mn) 0.05%, Iron (Fe) 4%

- Calcium (Ca) & Magnesium (Mg) regulate soil cation exchange capacity which determines the availability of many other nutrients in the soil.
- Magnesium (Mg) is the central atom in chlorophyll. Mg deficiencies frequently occur and are easily corrected with Cascade Minerals.
- Iron (Fe) is a catalyst to chlorophyll formation. Many synthetic Fe fertilizers are ineffective because the Fe converts rapidly to unavailable forms. The Fe in Cascade Minerals is stable in the soil, even on calcareous soils. Cascade Minerals Steadily supplies Fe to plants as they need it.
- Manganese (Mn) accelerates germination and maturity, while increasing the availability of phosphorus (P) and Ca.

Additional Minerals and Trace Elements include

- Silicon (Si) is the major element affecting the strength of plant cell walls.
- Copper (Cu) is necessary to chlorophyll formation.
- Zinc (Zn) deficiencies are common and is essential for promoting certain metabolic reactions.
- Boron (B) deficiencies are widespread and is essential for pollination and seed formation.
- Aluminum (Al) an important element for producing blue pigments in flowers.



BIOSOL

Biosol Mix® is a natural, environmentally safe fertilizer with high organic content. Biosol is a long acting, slow release fertilizer with a well blended nutrient ratio which stimulates micro organisms. Biosol is dried, pelletized, and bagged for convenient transportation, storage and application. It is used in revegetation projects, such as Road Cuts, Mining Reclamation, High Altitude Revegetation, etc. Some other uses are Lawns, gardens, flowers, trees, viticulture (cultivation of grapes), silviculture and vegetable growing. Biosol accommodates the need for a slightly faster nitrogen release rate.

Manufacture

During the manufacture of various antibiotics, enzymes, proteins, etc., a nutrient broth is extracted from the active ingredients. The broth then undergoes a second fermentation of 20 - 24 hours in which the dissolved nutrients are bound in a bacterial biomass. The biomass is then separated with decanters and bentonite is added. The mass is dried at 110 - 130° C for approximately 4 - 6 hours. It is mixed with a 50% fungal biomass (see Biosol® general description. Please note that potassium magnesia is not added to Biosol Mix®.), granulated and poured into 55 pound (25 kg) recyclable plastic bags. Biosol Mix® is sterilized and free of weed seeds.

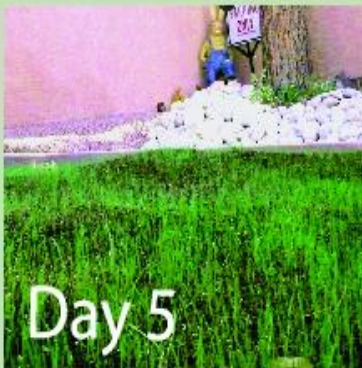
Composition

96% fungal and bacterial biomass, 4% water.

Nutrient Ratio

NPK 7-2-3

From Seed to Full Lawn Coverage in 7 to 9 days!



Guaranteed Analysis

TOTAL NITROGEN (N) 7.00%

0.50% WATER SOLUBLE NITROGEN

5.50% WATER INSOLUBLE NITROGEN

AVAILABLE PHOSPHORIC ACID (P₂O₅). 2.00%SOLUBLE POTASH (K₂O). 3.00%

Plant nutrients derived from fermentation of soybean meal, cottonseed meal, and sulfate of potash magnesia

Ecological fertilization

Biosol is a slow-release organic fertilizer where the nutrients are fixed to the organic substance and made available to the plants by soil organisms. Based on professional application, there is no nitrate stress to be expected in the groundwater. This is confirmed by the institute of microbiology at the University of Innsbruck. Especially low heavy metal contents induce additional ecological security.

As per EU regulation, Biosol is allowed to be used in organic farming. Furthermore, Biosol is annually checked and certified by Austria Bio Guarantee and OMRI.

Active soil life

Due to the high content of organic substance, Biosol improves the humus supply in the soil and optimizes its biological and physical properties. The result: intensive activity of the soil organisms and high crumb stability, as well as improved water storage capacity and water conductivity. As a further advantage, the plants benefit from the so-called priming effect: more nutrients are available that are released from the soil supply.

Mycorrhiza stimulation

Many plant species form symbiotic associations with mycorrhizal fungi which grow at the plant root and support the nutrient and water uptake of the plant. Biosol stimulates these mycorrhizal fungi. This has already been verified by experiments carried out with vine, berries (blueberries, raspberries), along with grasses.

Optimum yields

Biosol produces excellent yields and can be used in many areas, from arable farming to grassland. Biosol promotes soil improvement and nutrient mobilization in particular in poor soils. The assets of Biosol can be seen in particular in special cultures such as organically grown vegetables, berries or apples.

Healthy, vital plants

Biosol increases the plant resistance and, comparable to vaccination, builds up the plant's resistance to certain pathogens. This has been verified, among others, by experiment on tomatoes and its resistance to the fungus *Phytophthora infestans*. A clearly reduced infestation with *Plasmopara viticola* was also observed in vines.

More about Mycorrhizal Fungi

When a large, vigorous network of mycorrhizal hyphae is associated with a plant's roots, it exponentially expands the "reach" and surface area of those roots, giving the plant greater access to the nutrients the soil has to offer. This symbiosis is, of course, great for plants, because the extra nutrients can fuel better growth and increase resistance to drought and disease. There are only two instances in which mycorrhizal fungi do not provide benefits to plants: (a) when the soil already has such ideal nutrient and moisture levels that the



plants can scavenge enough on their own, or (b) when the plants are brassicas (members of the mustard family), which do not allow the mycorrhizal fungi to colonize their roots.

These mycorrhizal "wrapping and sticking" actions create soil aggregates that form air pockets in the soil. David D. Douds, Ph.D., a microbiologist with the USDA Agricultural Research Service (ARS), notes that different species of plants have different tendencies toward developing mycorrhizal associations. For example, he has found that leeks greatly benefit from mycorrhizal association in most years, while tomatoes and peppers are more likely to benefit when they are more nutrient-or water-stressed. Brassicas such as turnips and radishes do not form mycorrhizal associations under any conditions.

While these mycorrhizal associations can be excellent for plant growth, they also have positive impacts on the soil. Kris Nichols, Ph.D., a soil microbiologist with the USDA-ARS Northern Plains Research Station, is working to clarify the potential of mycorrhizal fungi to bind soil particles together into stable aggregates (or clumps) and increase amounts of long-lasting carbon in the soil. These benefits are derived in two ways: First, the mycorrhizal hyphae can physically wrap soil particles together, and, second, they secrete a substance, called glomalin, that is a sticky "goo" composed primarily of stable forms of carbon. These mycorrhizal "wrapping and sticking" actions create soil aggregates that form air pockets in the soil (holding air or water between the aggregates, where plant roots need them) and resist erosion, keeping organic matter and nutrients right where you want them (in the garden, rather than running off downstream).



Plants grown in Wonder Soil develop incredible root systems, such as the root system of this patch of grass.



EXCELERITE

Excelerite, a product of U.S. Rare Earth Minerals, Inc., is a potent clay-mineral product quarried in Panaca, Nevada. It is a totally organic product that substantially increases the nutrient uptake in plants by providing the micro-organisms in soil with an ideal food supply. The health of these micro-organisms in turn greatly increases the richness of the soil, thus leading to faster germination and stronger root systems in plants. Specific to Wonder Soil, it is the mycorrhizal fungi that directly benefit from Wonder Soil's use of Excelerite, since after watering the mycorrhizae activate, reanimate, and proceed to facilitate seed germination and root growth, all of which are enhanced by supplying this clay-mineral.

Excelerite is a natural occurring element that helps keep the balance of soil to a pH level between 6.7-7.3. It is natural, non-toxic, and has been proven to increase farm crop yields in different climates. Excelerite also provides a buffer to reduce the effects of extreme temperatures and environmental conditions. Though its water reducing effects are minor in comparison to other ingredients such as coir or acrylate polymers, Excelerite is one of several ingredients in Wonder Soil that decreases watering needs for plants, thus aiding in Wonder Soil's effort to reduce Las Vegas' water consumption.

Terra Villa Vineyard, FL:

Before using Excelerite



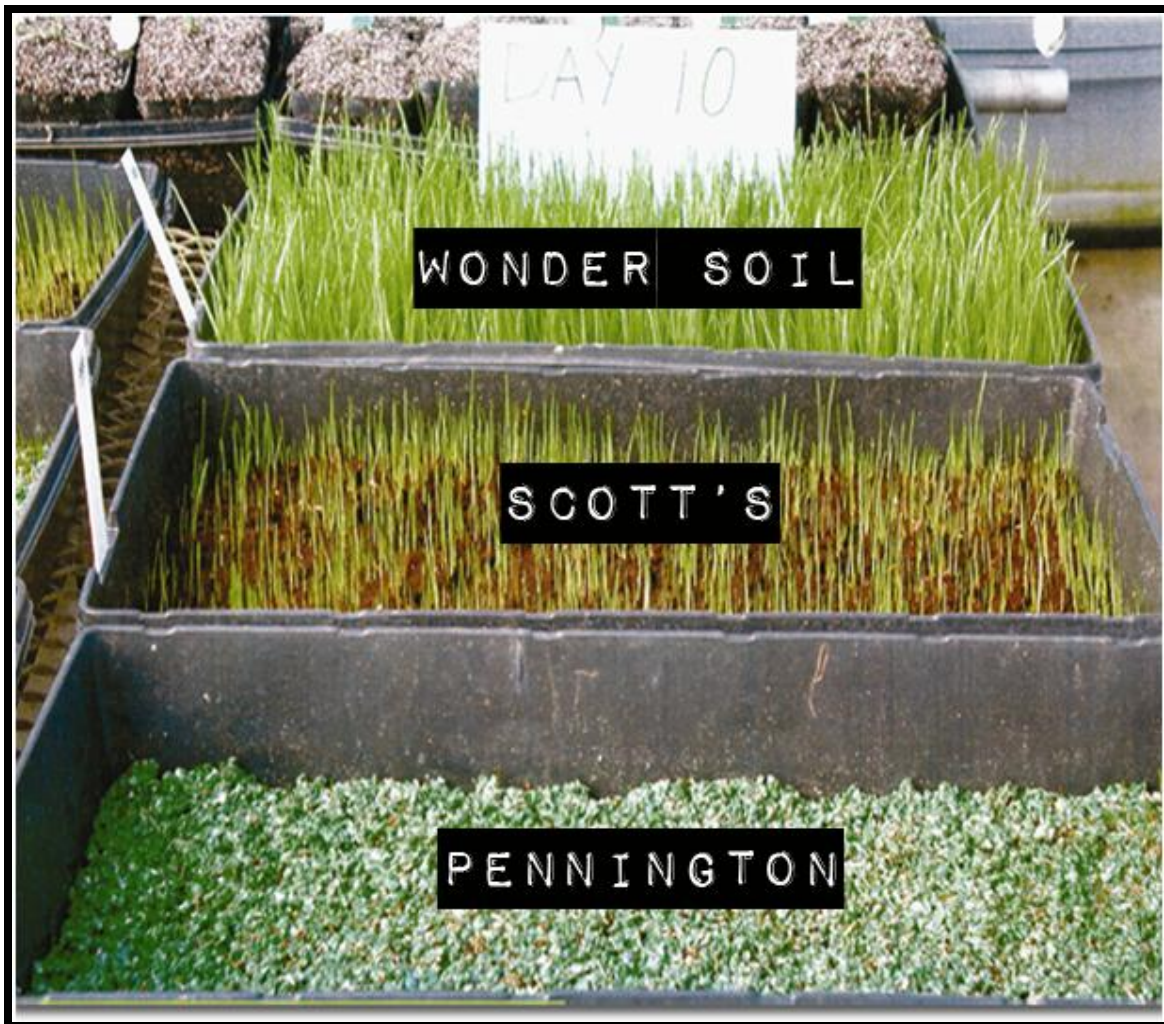
After using Excelerite



Excellerite Composition

MINERAL	QUANTITATION	MINERAL	QUANTITATION
Aluminum	28750	Molybdenum	0.1
Antimony	1.0	Neodymium	9.5
Arsenic	2.2	Nickel	5.8
Barium	607.2	Niobium	5.5
Beryllium	1.60	Osmium	-0.01
Bismuth	0.03	Palladium	-0.01
Boron	1.4	Phosphorus	327
Bromine	4	Platinum	-0.01
Cadmium	0.09	Potassium	11616
Calcium	19572	Praeseodymium	1.9
Cerium	20.5	Rhenium	-0.005
Cesium	5.8	Rhodium	-0.01
Chloride	0.17	Rubidium	33.8
Chromium	25.4	Ruthenium	-0.01
Cobalt	5.0	Samarium	1.7
Copper	9.0	Scandium	2.0
Dysprosium	1.4	Selenium	-0.5
Erbium	0.9	Silicon	64.32
Europium	0.3	Silver	.10
Fluorine	Trace	Sodium	5578
Gadolinium	1.8	Strontium	225
Gallium	8.5	Sulfur	411
Germanium	-0.2	Tantalum	0.9
Gold	-0.001	Tellurium	0.20
Hafnium	0.81	Terbium	0.6
Holmium	0.1	Thallium	0.21
Indium	-0.2	Thorium	0.6
Iodine	-0.5	Thulium	0.06
Iridium	-0.01	Tin	1.1
Iron	12127	Titanium	1030
Lanthanum	11.7	Tungsten	2.0
Lead	8.1	Uranium	0.6
Lithium	56.8	Vanadium	41.0
Lutetium	-0.1	Ytterbium	0.7
Magnesium	8188.0	Yttrium	5.9
Manganese	176.0	Zinc	26
Mercury	0.62	Zirconium	35





Wonder Soil consistently outperforms both Scott's and Pennington soils by a landslide. This picture shows Wonder Soil's unprecedentedly fast growth rate for grass. By day 10, grass grown in Wonder Soil is ready to be trimmed, while Scott's has only begun to grow and Pennington's grass has only begun to germinate.



ZEOLITE

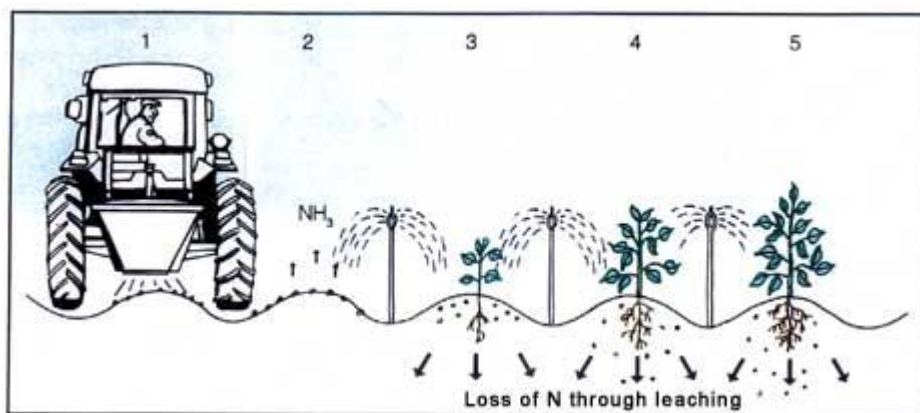
Zeolite is a naturally occurring mineral group consisting of over 50 different minerals. Made of a special crystalline structure that is porous but remains rigid in the presence of water, zeolites can be adapted for a variety of uses.

Zeolite in Soil Nutrient Holding & Release

Zeolite attracts and retains ammonium, potassium, calcium & magnesium as well as many trace elements. It has the greatest affinity for ammonium and potassium but when a plant is taking up the ammonium or potassium off the zeolite, the zeolite attracts calcium from phosphorus mineral apatite such as rock phosphate or locked up phosphorus in soil to balance the zeolites negative charge. This reaction releases a free phosphorus. The plant extracts the ammonium, potassium and other nutrients by active uptake from roots. This phosphorus release reaction with ammoniated zeolite has been established by the United States Geological Survey and the University of Colorado soil Science Dept.

The nutrient release from the Zeolite is plant driven setting up a natural cycle of nitrogen, potassium and phosphorus release. The Zeolite will recharge when an ammonium or potassium source becomes available either naturally or applied.

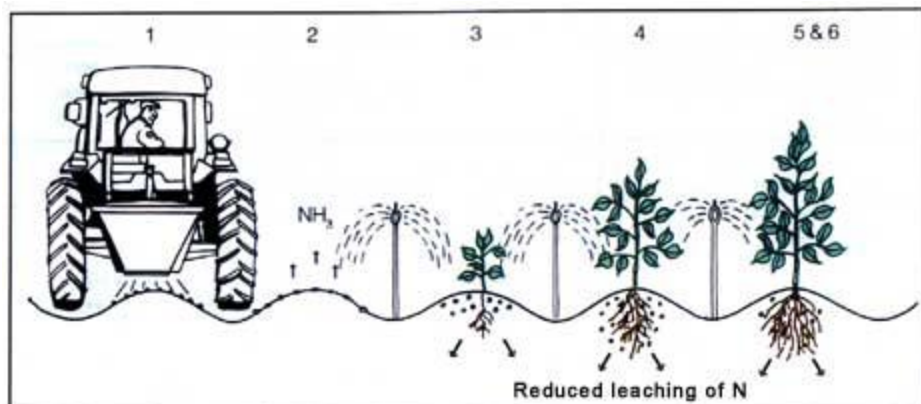
Without Zeolite:



- Broadcasting of N/K fertilizer onto soil surface.
- Irrigation after application reduces nitrogen losses due to volatilization - nitrogen lost as ammonia gas
- Irrigation washes fertilizer into the root zone of plants

- Plants can take up fertilizer required whilst it remains in the root zone. Some fertilizer lost through early leaching.
- Large losses of fertilizer which move out of the root zone (leaching) as sandy soil is not capable of holding high levels of nutrients.

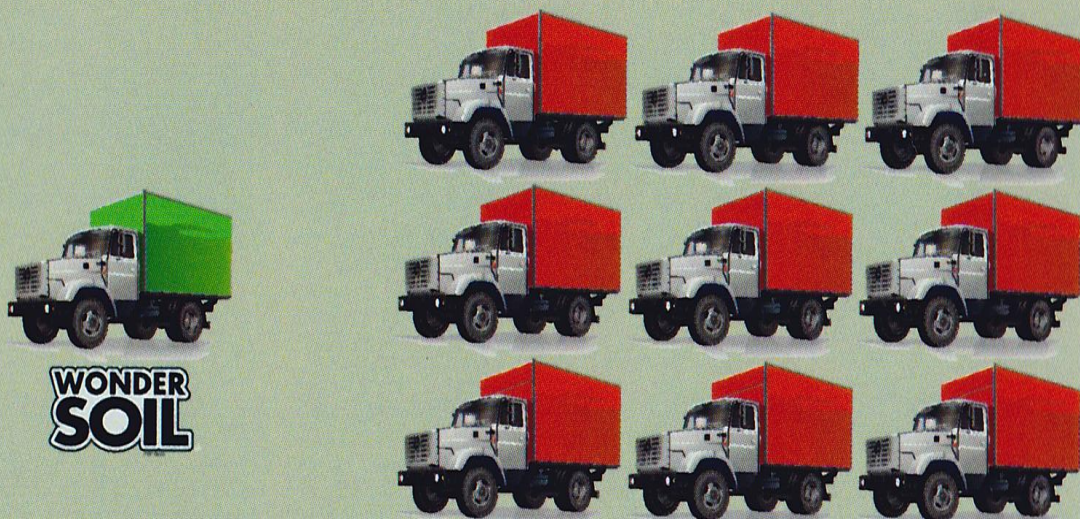
With Zeolite:



- A) Broadcasting of fertilizer to soil that has had an application of zeolite possible shallow incorporated; or
- B) Broadcasting of fertilizer including zeolite (mix or coating)
- Less risk of volatilization losses as zeolite soaks up free ammonia.
- Fertilizer in zeolite remains in root zone until it is required by the plant.
- Less fertilizer losses from leaching
- Long term soil improvements (increase in CEC and nutrient retention in soil).
- Irrigation washes fertilizer into the root zone of plants whilst some fertilizer remains bound up in zeolite

Wonder Soil[®] Freight Savings

[®]
Wonder Soil is a growing medium that expands up to
9 times in volume when re-hydrated



Traditional bagged soil

Wonder Soil offers tremendous savings of both freight and water. As you can see, it would take 9 truckloads of traditional soil to amount to just 1 truckload of Wonder Soil.



STOCKOSORB

Along with coconut coir, Stockosorb's crosslinked organic-synthetic acrylate polymers are a key ingredient in Wonder Soil's water-saving properties. These polymers have been proven to reduce irrigation needs, maintain a higher nutrient concentration, and to prevent leaching. One of the ways in which acrylate polymers are able to reduce irrigation needs is by first absorbing water that might otherwise matriculate through soil without being absorbed and then by trapping and equitably releasing that water throughout the course of a day, which prevents a substantial amount of water loss that would otherwise occur due to evaporation.

The following table, provided by the Soil and Health Library, shows the average annual precipitation vs. evaporation ratios in thirteen areas of the United States, two of those areas being located in Nevada.

This table conveys tremendous water loss due to evaporation, ranging from 60% to 190% water loss:

Place	Annual Precipitation (In Inches)	Annual Evaporation (In Inches)	Ratio
El Paso, Texas	9.23	80	8.7
Fort Wingate, New Mexico	14.00	80	5.7
Fort Yuma, Arizona	2.84	100	35.2
Tucson, AZ	11.74	90	7.7
Mohave, CA	4.97	95	19.1
Hawthorne, Nevada	4.50	80	17.5
Winnemucca, Nevada	9.51	80	9.6
St. George, Utah	6.46	90	13.9
Fort Duchesne, Utah	6.49	75	11.6
Pineville, Oregon	9.01	70	7.8
Lost River, Idaho	8.47	70	8.3
Laramie, Wyoming	9.81	70	7.1
Torres, Mexico	16.97	100	6.0



Stockosorb 600 Analysis

Physical Properties	660 Medium 660 Micro
Basis	Polyacrylic acid – Potassium salt, crosslinked
Appearance	Free flowing white granules
Particle Size Distribution (mm)	660 Medium 0.8 – 2.0 660 Micro 0.2-0.8
pH-Value (1g/l H₂O)	7.0-8.0
Maximum Absorption (free swelling conditions)	
1) 0,125% NPK 14-12-14 2MgO	150 mL/g
2) Tap Water (hardness grade 4)	100 mL/g
3) Synth, soil solution	60 ml/g
Absorption Against Soil Pressure	
(use conditions in soil at 20cd depth)	
1) 0,125% NPK 14-12-14 2MgO	80 g/g
2) Tap Water (hardness grade 4)	30 g/g
3) Synth, soil solution	20g/g
Water Available for Plants	95%
Toxicology/Ecology	Nontoxic for plants, soil organisms, and ground water according to OECD – Test Ecology



WORM CASTINGS

Earthworms derive their nutrition from many forms of organic matter in soil including decaying plant parts, decomposing remains of animals, and living organisms such as nematodes, protozoans, rotifers, bacteria, fungi. They can produce their own weight in castings every 24 hours. During the digestive process, many insoluble minerals are converted to a plant-available soluble form and long-chain molecules such as cellulose are partially broken down by bacteria in the digestive tract. Investigations show that fresh earthworm casts are several times richer in available nitrogen, available phosphates and available potash than the surrounding topsoil.

Worm Castings benefits soil in many ways:

- enriches soil in micro-organisms, adds plant hormones such as auxins and gibberellic acid, and adds enzymes such as phosphates and cellulase
- attracts deep-burrowing earthworms already present in the soil
- improves water holding capacity
- enhances germination, plant growth, and crop yield
- Improves Plant Growth: a 20% increase in plant growth and a 150% increase in root mass is possible by adding just 1 part of worm castings to 9 parts of soil!
- Worm Castings provide beneficial microbes that compete with disease causing organisms
- Microbes supplied by Worm Castings compete for available food sources



Roots Grown with Worm Castings

Roots Grown Without



Nutrient Analysis of Worm Castings

Nutrient	Approximate %
Nitrogen	2.34
Phosphorus	0.56
Potassium	1.00
Calcium	2.28
Magnesium	0.42
Sulfur	0.56
<i>(As % of dry matter basis)</i>	

Comparative Repair and Growth Study of Los Flamingos Golf Course in Marbella, Spain 2011



Normal maintenance and repair
with standard watering



Faster, fuller results with Wonder
Soil while using 50% less water





Ingredient Study 2013

MANUFACTURING

Since 2006, Wonder Soil has been working to perfect its formulas, personnel and manufacturing processes. Wonder Soil's headquarters has recently moved and expanded into a 25,000 square foot manufacturing and warehouse facility in Las Vegas, Nevada, where the climate is virtually humidity free. This is ideal for the production, packaging, and storage of dehydrated materials. Wonder Soil has added equipment, machinery and automation in excess of \$650,000 and is poised for production capacity at normal shifts of up to 16,000,000 pounds per year and with multiple shifts of up to 25,000,000 pounds per year.

The Wonder Soil product line emanates from the same primary mix with unique additives and formulas for each of the separate products. The company's original capital investment in equipment, automation, and inventory enables the company to produce over \$15,000,000 in product per year. With existing equipment and the current operational footprint, Wonder Soil can easily and efficiently increase production by a factor of 10 or more.



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