WOWGROWAlgae Mineral MAX

INGREDIENTS

"The effective integration of carbon, minerals, and microbes in farm and forestry management provides solutions to nutrient loss and helps mitigate point source solutions of primary nutrients such as phosphorus and nitrogen."

—Tom Vanacore, *Rock Dust Local*, rockdustlocal.com

WOWGROWAlgae Mineral MAX Additives

All the mineral additives in WOWGROWAlgae Mineral MAX enrich and mineralize soil including compost, promote vegetative and root growth, increase fruiting and flowering, enhance the flavor of produce, increase plant resistance to diseases and pests, boost plant starts, and reduce plant water needs. The mineral additives are all high in silica and trace elements. They play a major role in chlorophyll development and the photosynthesis process.

Basalt Rock Dust: A dark, fine-grained volcanic (igneous) rock that contains several micronutrients including iron, magnesium, calcium, and manganese, zinc, and soluble silicon, all of which are absorbed by and greatly benefit soil. Rock Dust has a high water-holding capacity. It increases microbial activity and root growth which allows for a greater uptake of nutrients by plants. It contributes to the building of humus complexes and supports soil fertility. Basalt also contains soluble silicon which strengthens plant stems and cell walls resulting in taller plants that capture more light for improved photosynthesis. Basalt Rock Dust bolsters crop resistance to pests and disease. It improves crop yields and enhances the flavor of edible crops. Basalt feeds microbes which advance land vitality and plant hardiness. Klamath Lake is perched atop of basalt, which stretches throughout the Northwest.
CDFA, OMRI listed, Oregon

Green Glacial Rock Dust: Past Ice Age expansion & contraction re-mineralizes soil & enhances its vitality. This natural fertilizer help release enzymes in soil to feed plants (rhizosphere activity). It improves plant structure, root growth, the cation exchange capacity & enriches compost including water retention in crops. This rock dust is an excellent source of magnesium, (helps store chlorophyll) manganese, zinc, silicon, iron, and other trace elements.
ECOCERT Certified, Canada

Green Sand: A mineral-rich blue-green colored glauconite that is harvested from ancient ocean floors. It contains a high quantity of important nutrients, including potassium (up to 3%) to enrich and mineralize soil for easily uptake by plants. Green Sand slowly and gently releases its nutrients which avoids root burn. It helps loosen soil, improves moisture retention due to its porous nature, softens hard water, increases root growth, and strengthens cell walls. It can retain water up to one-third of its weight. Another benefit of Green Sand is that it can break up clay soils to increase drainage and allow oxygen into the soil. It can also hold loose, sandy soils together and can be used to enrich compost.
OMRI listed, Brazil

AZOMITE® Volcanic Ash Deposit: A 30-million-year-old highly mineralized volcanic ash complex (Grand Mesa, Utah) formed from an ancient volcanic eruption into an inland seabed. The sea water cooled & fused the volcanic rock dust. AZOMITE® contains a variety of trace minerals including Calcium (1.8%), Magnesium (0.5%), Silicon, Manganese, and Potassium. It is a natural, organic product that re-mineralizes soil, wakes up its microbials, and encourages root growth. The benefits of using AZOMITE® include larger crop yields and better-tasting produce with greater nutritional value and enhanced flavor & color especially fruits & flowers.
CDFA, OMRI listed, Utah

Kelp Meal: Kelp is a brown-colored marine algae that has been used as a mineral-rich plant fertilizer since agriculture began. It boosts soil fertility, improves water retention capacity, and contributes over 70 minerals and vitamins to soil which benefits plant health. Kelp increases chlorophyll production in plants which allows plant root systems to grow faster and develop greater mass resulting in stronger and larger plants. Its restorative effect on plants is largely due to its high levels of cytokinin, a natural growth hormone. Kelp provides resistance to disease and cold temperatures and mitigates transplant shock by augmenting plant defenses. It is popular worldwide rinsed and mulched in many gardens/farms.
OMRI listed, North Atlantic Ocean, Iceland

Humates DG: (35% humic acid, 35% fulvic acid) Humates are dark-colored compressed organic carbon compounds that remain in the soil after the natural degradation of biomatter. Humates have long been recognized for their many beneficial impacts on soil and plant growth. They contain a growth promotant that enhances cell division and cell elongation. Beneficial microbes & fungi such as mycorrhizal fungi are encouraged to flourish. They stabilize Nitrogen & Carbon and increase their efficiency while aiding in the solubility and stability of Phosphorous & Potassium. Humates help stop carbon leaching while helping water & oxygen intake-nutrient uptake. Microbes break down the size of the nutrients for plants to absorb them more easily. They can be applied in every possible way. Humates are cost-effective, holding up to 20 times their weight in water (including providing worm tunnels) all of which reduces the amount of water needed for crop irrigation. They are a great value.

Humates are classified into three distinct categories: humic acid, fulvic acid, and humins; they complement each other and enhance their overall effectiveness. Humins are large-sized molecules whose primary role is to improve soil structure and increase water holding capacity. Humic acids function as essential ion exchange and chelation agents. Humates help plants handle stress more effectively and promote more rapid recovery when needed.
CDFA, OMRI listed, New Mexico

> **Humic Acid:** Elements easily bind to humic acids in a form that can readily be absorbed by turf roots and micro-organisms. Humic acids increase cell wall permeability which also enhances nutrient uptake. They chelate toxic metals preventing harmful material from entering the plant. They stimulate microbial activity in soil, increase water retention, and stimulate root and shoot growth. Soil texture is improved from this myriad of conditions.

Fulvic Acid: Fulvic acids are smaller molecules that consist mostly of carbon, hydrogen, nitrogen, and oxygen. Like humic acids, they are formed through microbial decay. They contain twice as much oxygen as humic acids and are more biologically active. The principal benefit of fulvic acids is their ability to bind to nutrients and transfer those nutrients into plants. They can carry an amount of nutrients many times their own weight. Fulvic provides slow vital nutrient release, chelates toxins & magnifies root growth.

CARBON Biochar & Other Types

Carbon is the main component of soil organic matter. It is the sponge that routes sugars and carbohydrates through plant roots to soil organisms augmenting the bioavailability of the soil. It increases a plant's ability to retain nutrients, water, soil structure to improve its quality, balance, and fertility. Carbon in soil boosts seed germination, encourages green growth, unlocks phosphates, breaks down chemicals, buffers salts, and mitigates weed growth. This illustrates high levels of the many forms of carbon in the improvement of soil. **Char carbon**: Pyrolysis process a potential soil amendment made from the incomplete burning of charcoal. It adds carbon to soil and can greatly enhance its water-retaining capacity and nutrient density. Char carbon can increase safely organic matter and microbial activity present in soil. Aids the bioremediation of contaminated soil. The multitude of chambers within the char carbon can increase the organic matter potential and microbial activity to improve soil biology.

Biochar: A stable & porous solid rich in carbon can endure in soil for thousands of years. It slowly decomposes in soil and becomes more effective in improving soil quality and expanding its boundaries. It stores and conserves nutrients and releases them as plants need them. It is used as a soil ameliorant for both carbon sequestration and soil health benefits. Biochar has a long history that predate colonization. **Hardwood Biochar:** Finely-ground activated charcoal that is formed by burning hardwood in the absence of oxygen. During this process, the physical & chemical properties of the hardwood change and become carbon-rich biochar through Pyrolysis process: Heating organic matter biomass without oxygen to decompose it. This creates greater potassium residues, lot of aerated chambers in the carbon for the microbes. OMRI listed, NOP compliant, Canada

Activated carbon filters are also used for soil remediation with very beneficial effects. They sequester carbon, increase moisture levels in soil, improve soil fertility, and break down chemicals. They provide a good environment for microbes and decrease nitrogen loss. Coconut shells, a renewable resource, are an ideal for filtration due to the high percentage of micro-pores on their surface which is helpful with removing contaminants. Earthworms can be added to coconut carbon **Soil Remediation**: Enhancing or controlling biological processes to purify or revitalize soil by removing contaminants and returning the soil to an unpolluted state. increased soil fertility, greater crop yields, and less emissions of greenhouse gases. **Terra Prieta** is the black soil of the Amazon. Carbon has been added to the soil and it has remained stable for thousands of years. Carbon binds to the soil & retains minerals & nutrients produce a large quantity of micro-organisms in soil and helps with soil balance and water holding capacity. Check out the links section to learn more on Biochar.

Silica (Silicon): Silica is a mineral compound made up of Silica & Oxygen. (SiO2) Being a protein transporter that feeds beneficial microbes, it increases carbon exchange in soil and improves soil texture. Silica enhances the strength and rigidity of plants and seedlings better tolerate stress and photosynthesize (higher chlorophyll content) further and grow taller. It improves plant and seedling tolerance to environmental stresses and attacks from pests and disease. The antifungal properties led to a greater resistance to insects. This has been shown to increase crop yields. Silica helps leaf stomata regulate moisture and temperature. It helps the plant develop stronger roots, stems and foliage, which provides a foundation for its structure.

Montana Grow Organic Silicon Granules with Amorphous Volcanic Tuff: (76% amorphous silica). Mined from an ancient deposit of silicon-rich, non-crystalline volcanic tuff formed by an ancient event that happened over 30 million years ago. It is a highly porous substance which allows nutrients to be absorbed more easily. It helps strengthen roots and stems and increases foliage. Amorphous silica increases the water-holding capacity of soil and provides a greater availability of phosphorus. The improvement of structure encouraged the stems & branches be more erect while supporting more foliar growth. Branch tips had high Silica levels. Cell wall growth & general resistance improved especially with the Grasses. CDFA, OMRI listed, U.S.A.

Soil Web: The soil-food-web is a community of organisms that live in the rhizosphere where the roots meet the soil. They interact together to help make nutrients more bioavailable. The sun's energy triggers photosynthesis in plants which results in carbon fixation, the process by which plants take inorganic carbon such as carbon dioxide and attach it to an organic molecule. This creates carbon and organic compounds that make up a plant's composition. A high level of carbon improves soil biology leading to an increased width and depth in plants and a greater ability to retain water. Topsoil is also improved. Soil organic matter continues to build and is used by simple soil organisms which decompose plant material. The feeding of soil microbes allows more nutrients to be released. Plant sugars then increase and feed soil microbes which, in turn, release nutrients that plants use.

Ion Exchange in soil: Cations (Ca, K, Mg, Na) are negatively charged ions and anions are positively charged ions. Nitrogen is a positively charged element and holds in the soil. The ability of soil to store a particular group of nutrients is known as a soil's cation or anion exchange capacity which describes the movement of these ions through the soil. Most soil particles are negatively charged while plant nutrients are both positively and negatively charged. The charge determines how long it will stay in or move through the soil.

Mycorrhizae: Fungal inoculants help form the basis of soil including structure by helping plants uptake water & nutrients. They stimulate the growth of micro-organisms in soil which helps expand plant root systems. Mycorrhizal fungi mine phosphorous & trace minerals. It improves plant growth and yields. Sugars (exudates) & carbon go into the soil; the soil The mycorrhizal fungi contribute to the humic acid exchange. returns fungi and bacterium which minimizes nutrient & water loss in their spongy structure.

WOWGROWAlgae Mineral MAX Intrinsic Factors

Aminos: Amino acids in plants are organic molecules that are synthesized from nitrogen and are absorbed through the roots. They are the building blocks of protein and act as precursors for growth hormones. They stimulate roots and increase nutrient and water uptake in plants. They help protect plants against insects, diseases, and stress. Aminos fuel carbon production and increase a plant's metabolism. They support germination and seed growth. Klamath Blue-Green algae is very high in aminos and other bioactive compounds. This is also true of the Azolla fern and other aquatic species that nourish soil. All of this including the mycorrhizal fungi contributes to the humic acid exchange causing higher uptake of plant nutrients.

Naturally Occurring Plant Hormones, also known as phytohormones, are organic substances produced within plants that play an essential role in plant growth and development to flowering and even the decline of the plant. They regulate plant functions at the cellular and molecular level. They determine the formation of the root, stem, leaf, and flower. They facilitate the shedding of leaves and fruit development. They play a crucial role in helping plants adapt to stress including acclimation, difficult soil conditions to heavy metals. The five main plant hormones are Gibberellins, Auxins, Cytokinins, Abscisic acid, and Ethylene gas.

Gibberellins: Abundant in seeds, young leaves, and roots, gibberellins regulate various developmental processes including stem elongation, seed germination, leaf expansion, transition into flowering, and the development of fruit buds, and flowers. They promote Growth hormones and nutrients that cause cell elongation and help produce new leaf nodes and buds while mitigating stem growth and elongation. This results in taller plants with greater fruit production. **Gibberellic Acid** digests amylase and converts it into simple sugars which help lipase break down into fatty acids and help proteins break down into aminos. Aminos are considered to be critical building blocks for protein utilization.

Auxins: A growth hormone that causes cell elongation. They are found in the growing regions of plants such as the buds and the tips of roots and shoots. Auxins also influence the orientation of stems toward light (phototropism) and against the force of gravity (geotropism). They also play a role in cell division, cell differentiation (the process of a cell changing from one type of cell to another such as from a less specialized cell to a more specialized one), fruit development, root formation from cuttings, and leaf shedding.

Cytokinins: Also involved in numerous aspects of plant growth including seed germination, fruit and flower development, leaf shedding, and enhancing plant resistance to pathogens. Cytokinins are produced by plant-associated micro-organisms, microalgae, and insects.

Abscisic Acid (ABA): A stress hormone named for its role in response to stress environments. Abscisic acid is a growth inhibitor and is associated with physiological functions such as seed maturation, seed germination in a stress-free environment, dormancy formation, and the storage of compounds. The leaves help with dormancy by keeping the stomata closed to prevent water loss.

Ethylene Gas: Gaseous hormone and growth inhibitor that stimulates germination, activates fruit maturation, inhibits elongation, increases horizontal growth, and programs cell death as the cycle is completed. An example of this is bananas ripening in a bag as gases are released.

Orange Oil (Florida, steam-distilled D-Limonene): This powerful cleaning agent with a pleasant aroma helps reduce plant stress.

Note: The Links section of this website was a major part of this Bibliography