

Humates are mineral salts of humic or fulvic acids and exist in any humic substance as complex humate molecules. They result from randomly accumulated vegetative plant and animal biomass that has laid dormant under intense pressure, and has cured over millions of years. Leonardite Humates (named after Dr. A.G. Leonard) are actually precursors to coal formations. Humic substances are the components of humus that together form the brown to black hydrophilic, molecularly flexible, polyelectrolytes called humus. Humic acids, Fulvic acids and Humin are all defined as humic substances. The positive impact and bio-stimulative affects they have on plants and soils is indisputable.



Humic Substances in SOILS reduce soil erosion by increasing the cohesive forces of fine, colloidal soil particles. Together with non humic (organic) compounds, they also provide energy and mineral requirements for soil microorganisms. Beneficial soil organisms lack the photosynthetic ability to capture energy from the sun and survive on residual carbon containing substances on or in the soil. These organisms (algae, yeasts, bacteria, fungi nematodes, mycorrhizae and small animals) use this energy to perform numerous beneficial functions which influence both soil fertility and plant health.

Water is the most important substance derived by plants from the soil. Humic substances function as water sponges, creating a desirable soil structure that facilitates water infiltration and helps hold water within the root zone. When applied to clay soils, humic acids help break up compacted soils, allowing enhanced water penetration and better root zone growth and development. When applied to sandy soils, humic acids add essential organic material necessary for water retention, improving the root growth and enhancing the ability to retain vital plant nutrients.

Applied FOLIAR, humic acids significantly reduce water evaporation and increase its uptake by plants in less organic, more sandy soils. Humic acids aid in correcting plant chlorosis, increase the permeability of the plant cell membranes and intensify enzyme systems of plants. They also accelerate cell division, show greater root development, and decrease stress related plant decline. Under the influence of humic acids, plants grow stronger (increases vigor) and resist plant diseases better. Research shows that humic substances enhance nutrient uptake, reduce uptake of toxic elements, and improve the plant response to soluble salts (fertilizers) in highly maintained turfgrass stands. The addition of humic acids help improve carbohydrate content and nutrient concentration in leaf blades and sheaths while under stress.

SUMMARY: Although not a fertilizer, humic acids have a significant impact on fertility. Whether used directly or indirectly with turf or ornamentals, humic acids (Humates) are an **effective complement** to synthetic or organic fertilizers. Regular use of humic acids lessens

the need for fertilization due to the soil and plant ability to more effectively utilize existing nutrients. Ultimately, if sufficient organic material is present within the soil, it could eventually become self-sustaining through microbial processes and humus production. Humates are best suited to be utilized in conjunction with best cultural practices and sound NPK custom fertility programs. The BioPlex Technical Support Team remains ready, willing, and able to discuss how 'you too' can best utilize and employ beneficial Humates in your future projects.

