



## Nature Helping Science Restore the Natural Process of the Soil Food Web®

### What are humic substances?



Humic substances are natural bio-polymers possibly involved as mediators in numerous life processes. Collectively these substances when found in soils are called Humus. Unlike the organic matter content of soils, Humic substances have no calorie value and require specific analysis techniques to identify in soils or in Soil Conditioning products.

They are not fertilizer under the law in most states and do not replace fertilizers, but they should enhance the absorption by plants of both supplemented fertilizers as well as naturally occurring plant available nutrients coming from the decay of organic matter.

Humic substances come from the accumulation and natural polymerization of by-products yielded by the biodegradation of organic matter. This process is called Humification!

### Humic substances are made up of 2 major sub fractions:

#### 1) *Fulvic acids*

- Younger molecules
- Highly reactive
- Easily leachable
- Water soluble at all pH
- Are of low molecular weight
- Have a structure that is randomly organized
- Are highly oxygenated aliphatic & aromatic biopolymers
- Have a cation exchange capacity of 900 – 1400 meq/100 g
- Are a light yellow to yellow – brown in color depending on the concentration

## 2) *Humic acids*

- Are older molecules
- Dark brown to black in color
- Excellent reactivity
- Are insoluble at a normal none caustic pH
- Are slow release for long term effect
- Have a structure that is randomly organized
- Have a high molecular weight
- Are mostly polyphenolic aromatic biopolymers
- Have a cation exchange capacity of 350 – 900 meq/100 g

### What may humic substances do for your plant?

Secure (chelate), carry mineral nutrients and deliver them where it counts. Naturalize your chemical fertilizer and initiate a real biological synergy

Assuming proper environmental conditions, **Fulvic** and **Humic Acids** may act as:

- detoxifiers
- strong antioxidants
- bioprotective agents
- natural free radical scavengers
- buffering agents of high salt related stress

factors

- accelerators of metabolic rate and cell division
- enhancers of fertilization efficiency and nutrient uptake
- promoters of seed germination, root growth and plant development
- Promotes better soil structure, drainage, porosity and aggregation which results in better root development and plant health



### Why can't we be more affirmative about the beneficial effects of humic substances on plants?

Humic substances and their effects on plants are for real. They have been confirmed and abundantly documented by university researchers around the world since the beginning of the 20th century, and are still actively studied today. However, because of their randomly organized molecular structure, science can neither describe the exact mechanisms that are responsible for the observed beneficial effects nor predict and quantify their effect on plants with scientific accuracy.

The facts are undeniably; Humic substances are always beneficial, but sometimes in an unpredictable or unexpected manner.

## Why is Soil Secrets devoting so much research and energy to humic substances?

At Soil Secrets we believe if a natural factor has been constantly beneficial to life for thousands of years, even if science cannot explain it totally, we should simply use it and humbly let nature have its way! Our founder Michael Martin Melendrez is trained as a professional physiologist and likes to say “Hundreds of thousands of years of research and development have gone into this natural process, who are we to challenge it?”

Along with many other world-class scientists, our Soil Secrets staff is convinced that Humic substances are multifunctional natural molecules provided by nature since the beginning of life, and they are still part of the ‘Natural Process’ today, like "Vitamin C" for humans, a fundamental life factor for plants, soil and all the Soil Food Web.

**At Soil Secrets, we choose to use a living and viable form of humus that Michael calls Cultured Humus<sup>®</sup> invented and manufactured by our company using an exclusive and unique proprietary knowledge as the primary delivery material of our Soil Inoculums of beneficial soil borne microorganisms including the mycorrhizal factors.**



**Cultured Humus<sup>®</sup> meets and exceeds the standards of all Organic Certification entities including the USDA NOP (National Organic Program).**