



“Humic substances are recognized by most soil scientists and agronomists as the most important component of a healthy, fertile soil.”

*- Dr. Robert E. Pettit, Emeritus associate Professor,
Texas A&M University*

MESA VERDE HIGH-QUALITY NEW MEXICO HUMATES

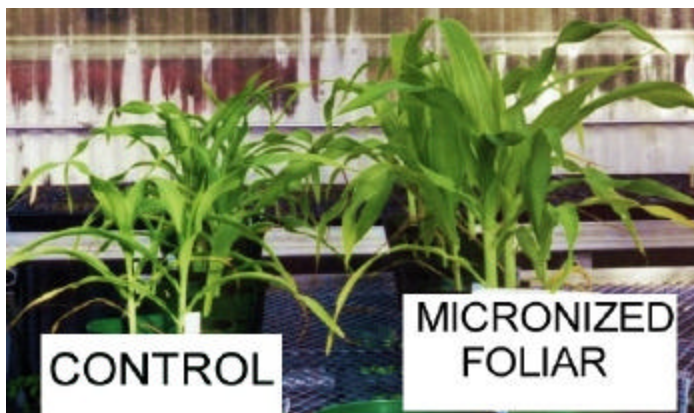
From a naturally occurring source, geological deposits of organic material which contain concentrated Humic Acids in the form of oxidized lignite (humates). Mesa Verde humates are an economical method of applying concentrated humic acid to the soil. Why? Some soils, typical of the western U.S., may be deficient. Other soils which are cultivated over a long period of time with only NPK as inputs have solely the humus additions that are formed from any crop residues left behind. Generally, this is less than the native vegetation provided.

❖ Reduce drought stress and improve yield stability

When wheat plants were subjected to drought stress at head development stage, grain yield by untreated plants was depressed by 30% compared to the irrigated control. However, fulvic acid treated plants suffered only a 3% yield loss compared to the irrigated control. Xudan 1986.

❖ Reduce heat and salt stress

In Northern China, fulvic acid was sprayed on plants just before head development, and allowed to grow to maturity over time when hot, dry winds are prevalent. It was found that grain yield was increased by 7% to 18% over the untreated controls. Xudan, 1986.



MVR Greenhouse Test:

Control - untreated corn

Micronized Foliar – corn treated with a foliar application of liquid Micromate

❖ **Improve soil aeration, tilth, workability, and water filtration**

*A significant increase in water-stable aggregates was found in a sandy loam and a strong clay soil after treatment with humic substances derived from coal. Increased water infiltration and percolation, **reduced runoff and resistance to erosion**, and **increased aeration** are other beneficial effects that are indirectly supported by humic substances. Piccolo and Mbagwu, 1989.*

❖ **Increase soil water holding capacity**

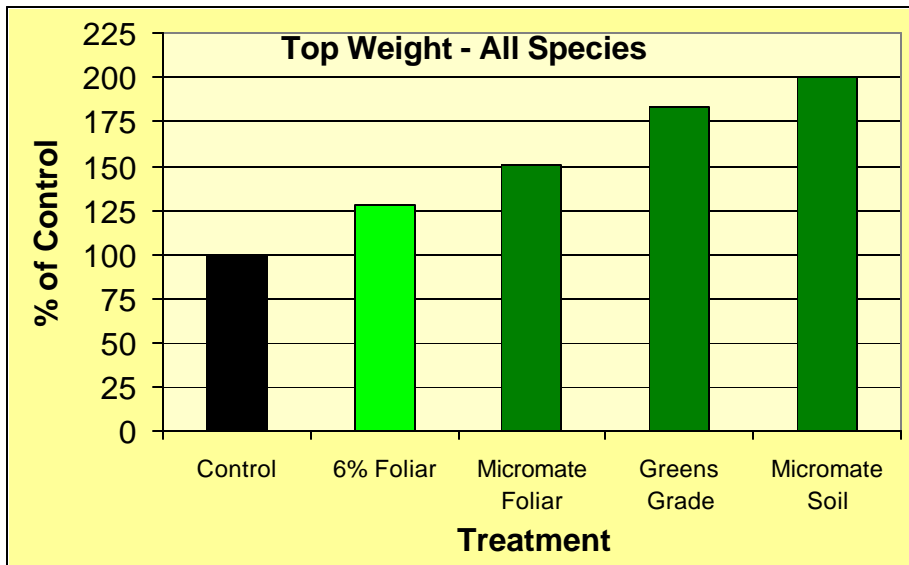
Humic acids are heterogeneous substances, which include in the same macromolecule, hydrophilic acidic functional groups and hydrophobic groups. The humic acid hydrophilic groups attract hydration, thus increasing the water retention capacity in soils. Stevenson, 1994.

❖ **Increase water uptake**

Lettuce and tomato seeds were treated with unfractionated humic acids derived from oxidized lignite. The increase in the fresh weight of the seedlings was attributed to cell elongation and more efficient water uptake in the presence of humic acids. Piccolo et al., 1993

❖ **Stimulate top growth**

One of five levels of commercial granular humate was added to greenhouse-grown Chardonnay vines planted in a sand medium. Shoot length responded to increasing levels of granular humates. Fresh and dry weights of leaves, shoots, and roots, as well as leaf count and area, exhibited increasing linear or quadratic trends in response to increased level of granular humate. Reynolds et al., 1995.



MVR Greenhouse Test:
MICROMATE
foliar and soil-applied
vs
• Control
• Liquid humic acid
• Granular humate (greens grade)

❖ **Stimulate root growth**

Increases in root mass, length, or number of initials were reported on the several crops grown in sand or nutrient solutions to which were added humic or fulvic acids, or extracts from oxidized lignites. Examples include:

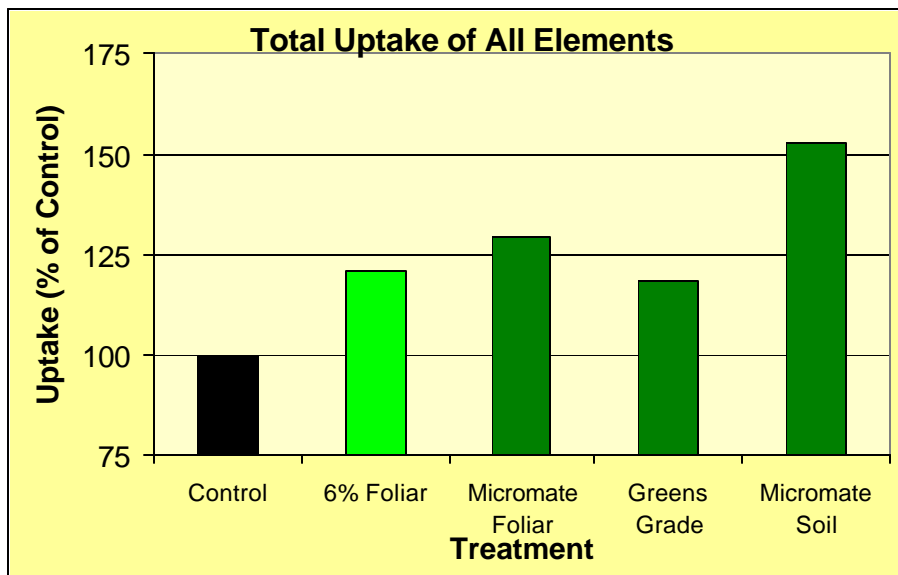
- Beans – Schnitzer and Piapst, 1967.
- Corn – Ivanova, 1965; Alexandrova, 1977.
- Cucumber – plants by Rauthan and Schnitzer, 1981.
- Grapes – Reynolds et al. 1995
- Millet – Alexandrova, 1977.
- Pepper – Sanchez-Conde et al., 1972.
- Sugar beet – Sanchez-Conde et al., 1972.
- Tomato – Sladky, 1959; Lineham, 1976; Adani et al., 1998.

❖ **Stimulate chlorophyll production**

An increase in chlorophyll contents resulted from applications of humic substances in nutrient solutions to tomatoes. Humic acid treatment increased chlorophyll density by 63% and fulvic acid increased chlorophyll by 69%. Sladky, 1959.

❖ **Provide stimulus for beneficial soil microorganisms**

It was found that humic acid as sodium humate and fulvic acid had a marked growth stimulating effect on Rhizobium trifolii. Humus extract dialyzed for fulvic acid exerted appreciable growth stimulating influence (over 200% greater growth rate than without) and undialyzed sodium humate produced 52% greater growth rate than without. Bkardwaj and Gaur 1972.



MVR Greenhouse Test:

MICROMATE
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❖ **Increase nutrient uptake**

Humic acids were added to an alkaline soil with Phosphate fertilizer to wheat grown in field trials. It was observed that Phosphate uptake and yield were both increased by 25%. Wang et al. 1995

❖ **Make nutrients available to plants**

The effect of humic acids on transformation of phosphorus fertilizer in an alkaline soil was studied. Soil phosphate was fractioned following 4 and 15 days incubation after humic acids were applied with phosphorus fertilizer to the soil. The availability of phosphate in the soil and in plants was determined at heading stage and at maturity in a pot experiment, and wheat yield was examined in a field trial. Addition of humic acids to soil with Phosphorus fertilizer significantly increased the amount of water-soluble phosphate, strongly retarded the formation of occluded phosphate, and increased the phosphate uptake by 25%. Wang et al. 1995

❖ **Assist in pest and disease defense**

*Humic and fulvic acids appear to cause the genetic mechanism of plants to function at a higher level. **Plants under stress** emit a different frequency that **will attract certain predatory insects**. Thus, the goal is to develop a well balanced plant and soil diet of humic and fulvic substances along with a healthy microorganism population so that the plant's overall defense system will be strong enough to protect itself from insect invasion. William Jackson, Ph.D.*

❖ **Reduce absorption of toxic metals and pesticides**

Research by Chiou (1990) shows that humic substances influence the effects and mobility of nonionic organic compounds, both pesticides and pollutants, by removing these compounds from aqueous solution. Soil organic matter (humic substance) is the fraction in surface soils that is most active in the sorption of nonionic pesticides and pollutant molecules from aqueous systems. McCarthy, et al, 1990.

❖ **Reduce absorption of herbicides**

***Atrazine** is a widely used herbicide...it is toxic, bioaccumulative and persistent. It was shown that the effect on atrazine photolysis depends on the Humic Substances concentration. In this case, the higher the concentration of Humic Acid is, the higher the photolysis rate of atrazine becomes. At 120 ppm, about one fifth of atrazine disappeared after 10 days. At 240 ppm, about one third of atrazine disappeared after 10 days. The photochemical fate of the persistent atrazine will be changed if there is enough Humic Substance present. Zeng, Hwang, Yu, 2002.*

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