

# **Fulvic, Humic, and Ulmic Acid Roles In Agriculture**

## **The Benefits**

- Humates feed the soil microbes which in turn release the nutrients such as nitrogen, phosphates and other trace elements
- Humates offer the opportunity of increased worm counts to enrich soil
- **Humic acids** - enable the plants to extract nutrients from the soil
- **Ulmic acids** - stimulate and increase root formation and growth
- **Fulvic acids** - give plants strength to withstand stresses caused by pests, dry weather and cutting

## **Physical - modification and improvement of the soil:**

- Increases aeration of soil
- Improves soil structure (more friable and crumbly)
- Improves workability of soil and enhances the seedbed
- Increases the water holding capacity of the soil
- Increases a plants ability to resist drought
- Enriches the soil color

## **Biological - stimulation of plants and soil microbes:**

- Improves germination of seed
- Increases plant growth (accelerates cell division and increases rate of root development)
- Stimulates root growth
- Increases the permeability of plant membranes increasing the uptake of nutrients by up to 40%
- Increases vitamin content of plants
- Stimulates the growth and proliferation of desirable soil micro - organisms, as well as algae and yeasts
- Stimulates plant enzymes
- Improves plant photosynthesis
- Acts as an organic catalyst
- Contains a wealth of micro-elements including: Fe,Mg,B,Mn,Co,Zn,Mo,Cu,Na,Se

## **Chemical - improving fixation properties of the soil:**

- Possesses a high Cation Exchange Capacity (CEC) which aids in moisture and nutrient retention.
- Chelates metallic elements make these elements more plant available
- Rich in both organic and mineral substances essential to plant growth
- Retains water soluble fertilizer in root zones and releases them to plants as needed
- Increases buffering properties of the soil
- Participates in the decomposition of rocks and minerals
- Humic acid is a powerful fungi stimulant. Beneficial fungi are the missing link in many soils.
- Stabilizes nitrogen and improves nitrogen efficiency (ideal as an additive with urea).
- Complexes phosphate to reduce lockups (ideal as an additive with DAP/MAP, etc.)
- Natural chelating and complexing agent to help magnify nutrient absorption
- Contains an auxin-like growth stimulant that can enhance cell division and elongation
- Can buffer the effects of excessive elements (particularly sodium), toxic chemicals and heavy metals
- pH buffering-capacity to help neutralize the problems associated with pH extremes
- Has a nature which assists in soil wetting
- Promotes soil structure improvement by stimulating fungi to create a crumb structure for better water and oxygen intake and improved root penetration.
- Certified organic