

# **Growers Mineral Solutions**

Growing Healthy Plants

# What is a plant?

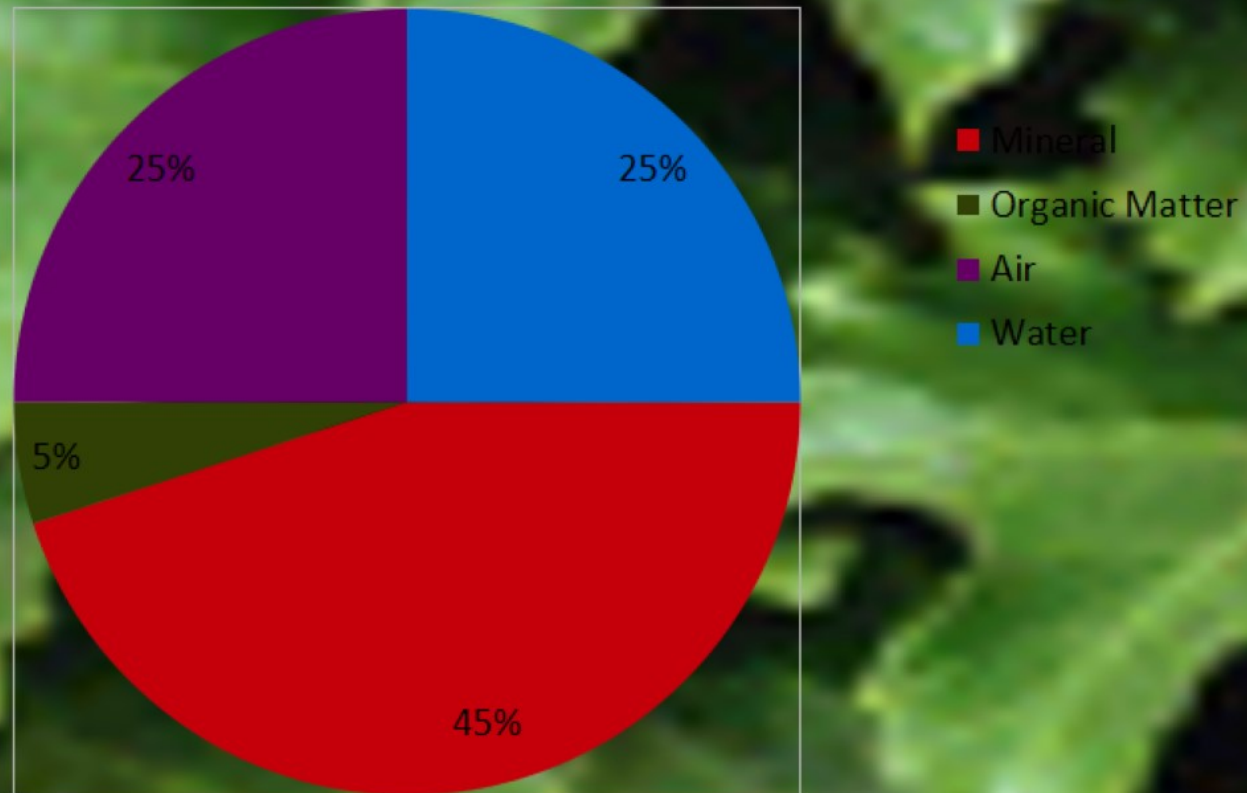
.96% carbon, hydrogen, and oxygen, 4% mineral

.The chemical (minerals), physical (soil composition) and biological (microbial life) are all important

.Therefore, we must simply facilitate a healthy growing medium



# Soil Composition



# How does a plant grow?

- .Photosynthesis, water and CO<sub>2</sub> absorption to make starch
- .Roots and leaves absorb nutrients for tissue and growth regulation
- .Microbial life in the soil lives in symbiotic relationship with plant roots



# **What prevents growth?**

- .Lack or excess of water, lack of sunlight
  - .Tight soil
  - .Unbalanced nutrients
- .Toxicities (salts and/or heavy metals)

# What do we influence?

- .Cannot fix water or sunlight problems or, nor change the soil type
  - .Condition of soil more manageable
  - .Tillage, but most importantly calcium
- .Can prevent more toxicity by using clean fertilizers



# What does calcium do?

- .Floculates soil for pore space, better root penetration and water infiltration
  - .Cation Exchange Capacity
- .Important nutrient for plant cell development
  - .Vital for healthy microbiological life

# Why clean fertilizer?

- .Soil microbe community will prioritize metabolizing toxins over feeding plants
- .Allows for fertilizer to be placed closer to the seed and sprayed on leaf surfaces for more efficient use



# Why foliar spray?

- .1950's University of Michigan test found that plants absorb nutrients through leaves
- .Clean liquid fertilizers 80-95% efficient when foliar sprayed
  - .Allows for less fertilizer to be used
- .Dry fertilizer only 20% efficient under near perfect conditions

# How can we help our soils?

- .Soil tests a guess at best, pH a poor indicator of nutrient availability
- .Soil type important to know, but all soils can produce a good crop
  - .Best indicator is the crop
- .For calcium needs, strip tests in the field are the best indicator



# Other Considerations

- .Cover crops fix nitrogen and feed microbiology
- .Inter-row cropping can provide an alternate income until trees mature
- .Goal is still to provide a healthy growing medium that allows the plant to grow as it is designed to do