

Healthy Soils Program Soil Presentation

March 12, 2020



AGRI
SERVICE

SUSTAINING THE CYCLES
Organic Recycling
Mulch
Soil Amendments

Healthy Soils Support Healthy Plants



Characteristics of “Healthy Soils”

- Granular Structure
- Organic matter suitable for plant palette
- Nutrient and water reservoirs are sufficient to meet plant needs
- Friable, good tilth



“Unhealthy Soils”

- Compacted, poor structure
- Heavy salt load
- Insufficient organic matter present for good plant growth, increased water holding capacity and to support soil life
- Plants subject to increased pathogen and pest pressure



Definition of Soil

- The layer of unconsolidated particle derived from weather rock, organic material, water and air that forms the upper surface over much of the earth and ***supports plant growth.***

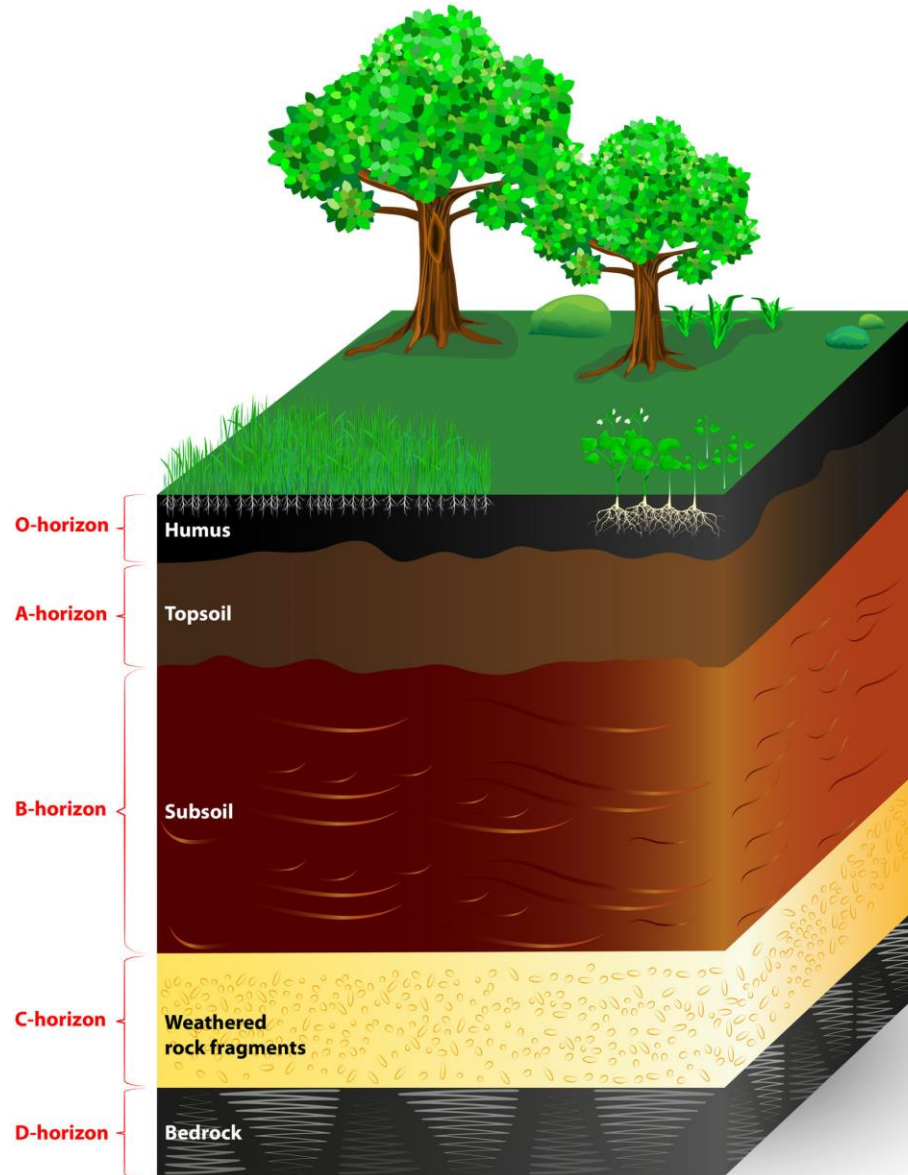


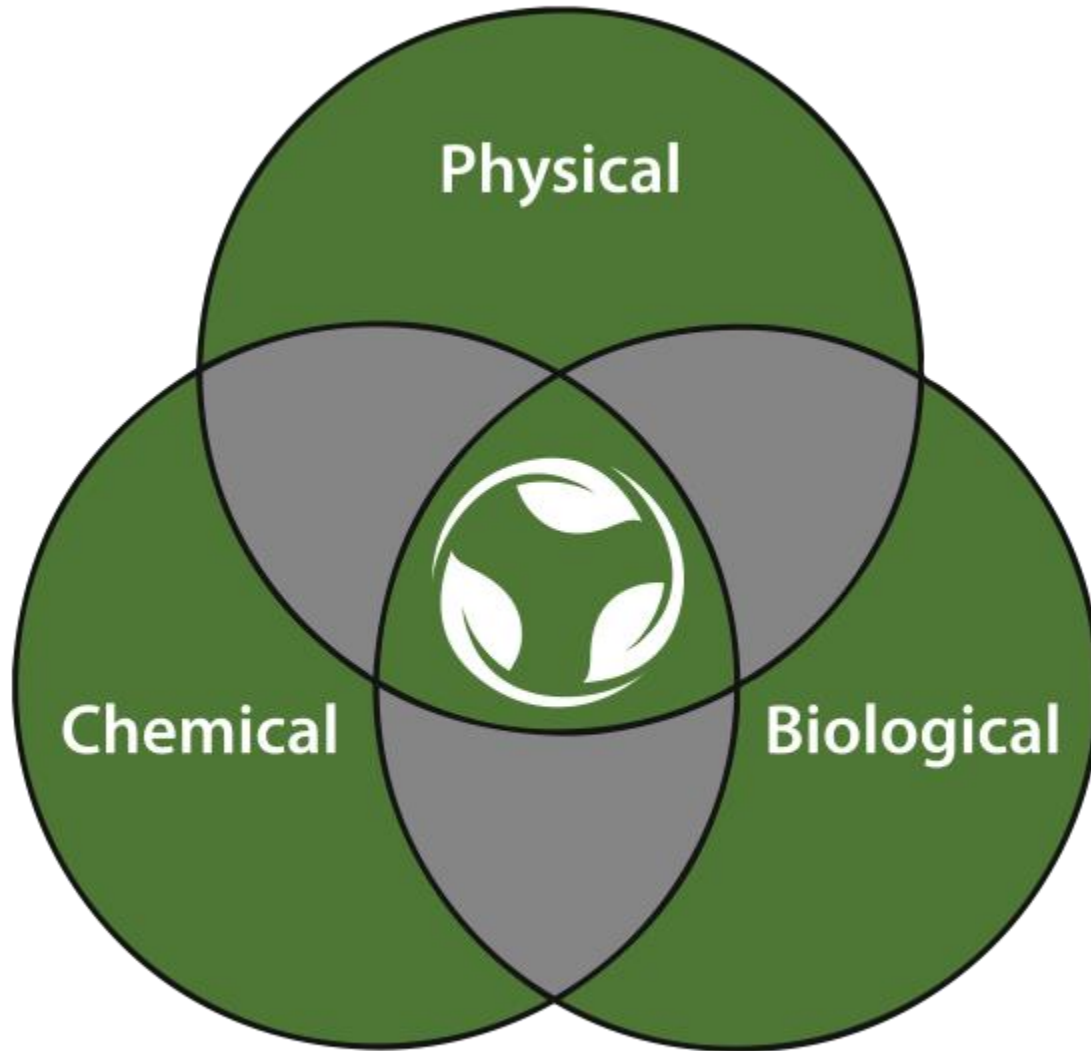
Challenges of Arid and Desert Soils

- High Salts
- Low Organic Matter
- Variable pH
- Sporadic Rainfall
- Salty Water
- Human Activity



SOIL LAYERS



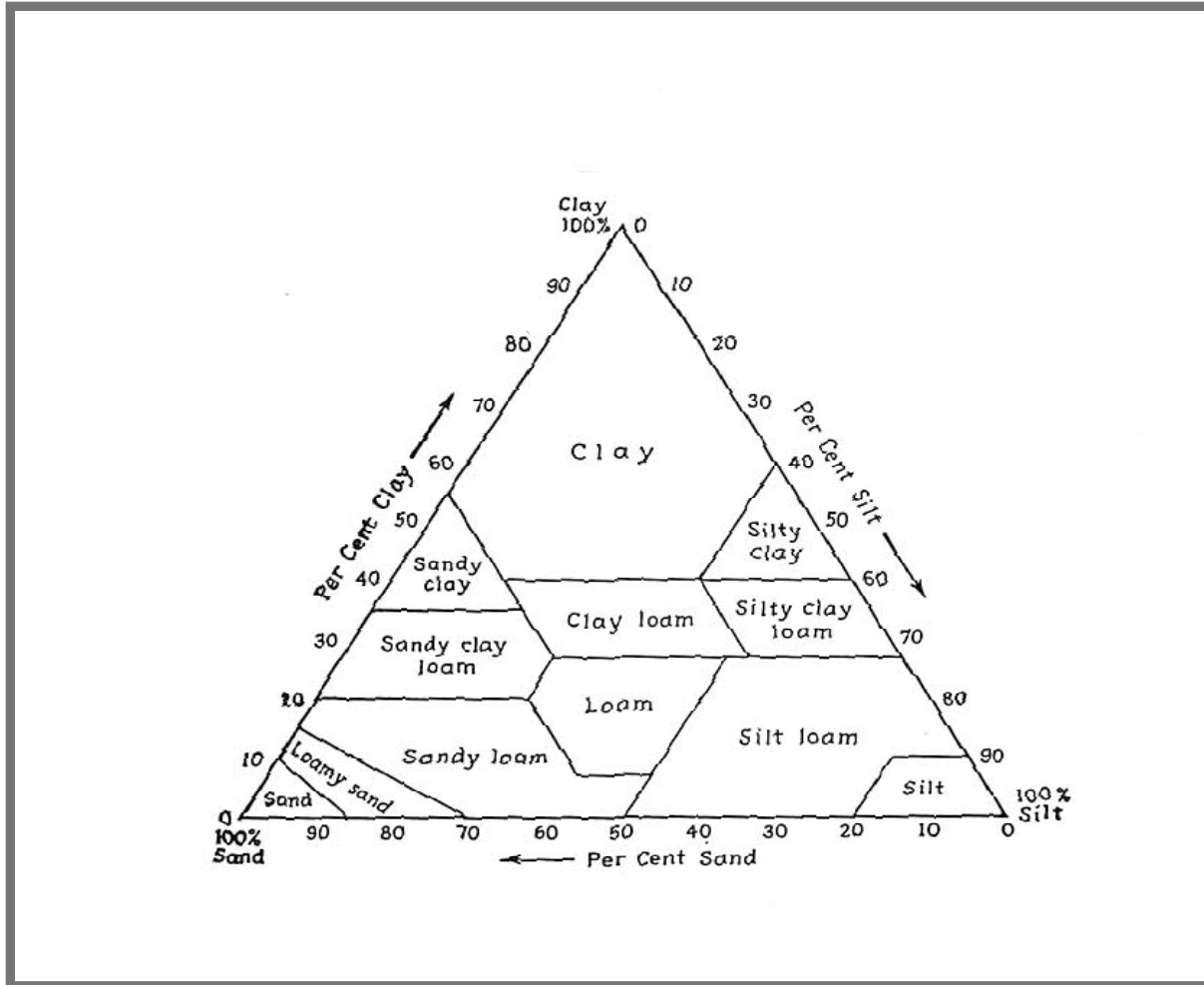


Physical Characteristics

- Texture
 - Percent of Sand, Silt and Clay
 - Percent of Organic Matter
- Structure
 - Arrangement of Particles
- Compaction
- Drainage



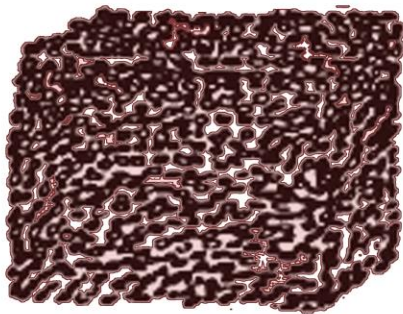
Soil Texture



Soil Structure

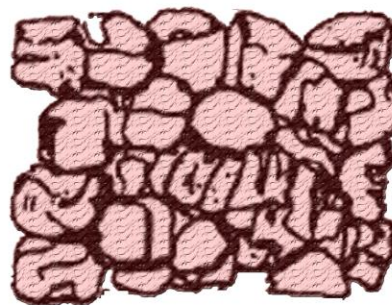
Single Grain

Rapid Infiltration



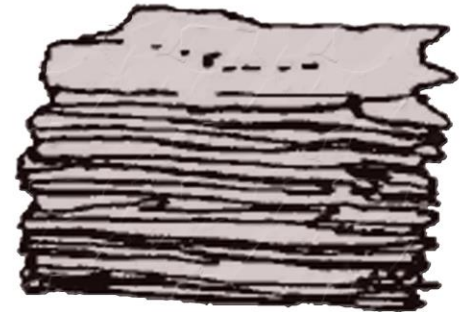
Blocky

Moderate-Slow infiltration



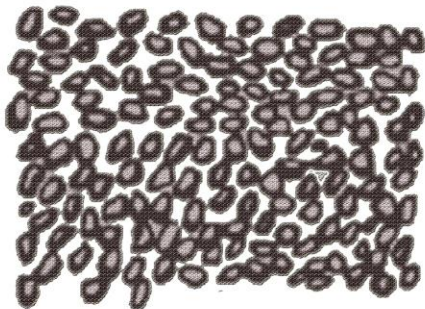
Platy

Slow-Very Slow Infiltration



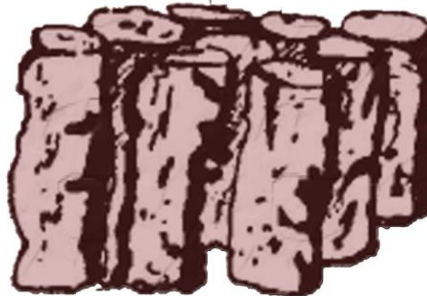
Granular

Rapid-Moderate Infiltration



Prismatic

Moderate-Slow Infiltration



Massive

Very Slow Infiltration



Importance of Soil Structure

Micro-Aggregates

- clay microstructures, silt-size microaggregates, particulate organic matter, plant and fungus debris, and mycorrhizal fungus hypha
- Relatively stable
- Building blocks for macro-aggregates



Importance of Soil Structure

Macro-Aggregates

- Bound by fungi hyphae, root fibers, and polysaccharides
- Reduce bulk density of the soil
- Are less stable than micro-aggregates, easily subject to compaction



Importance of Soil Structure

Macro-aggregates provide macro-pores

- Drainage
- Ability to leach
- Air space
- Reduces water molds and root rot

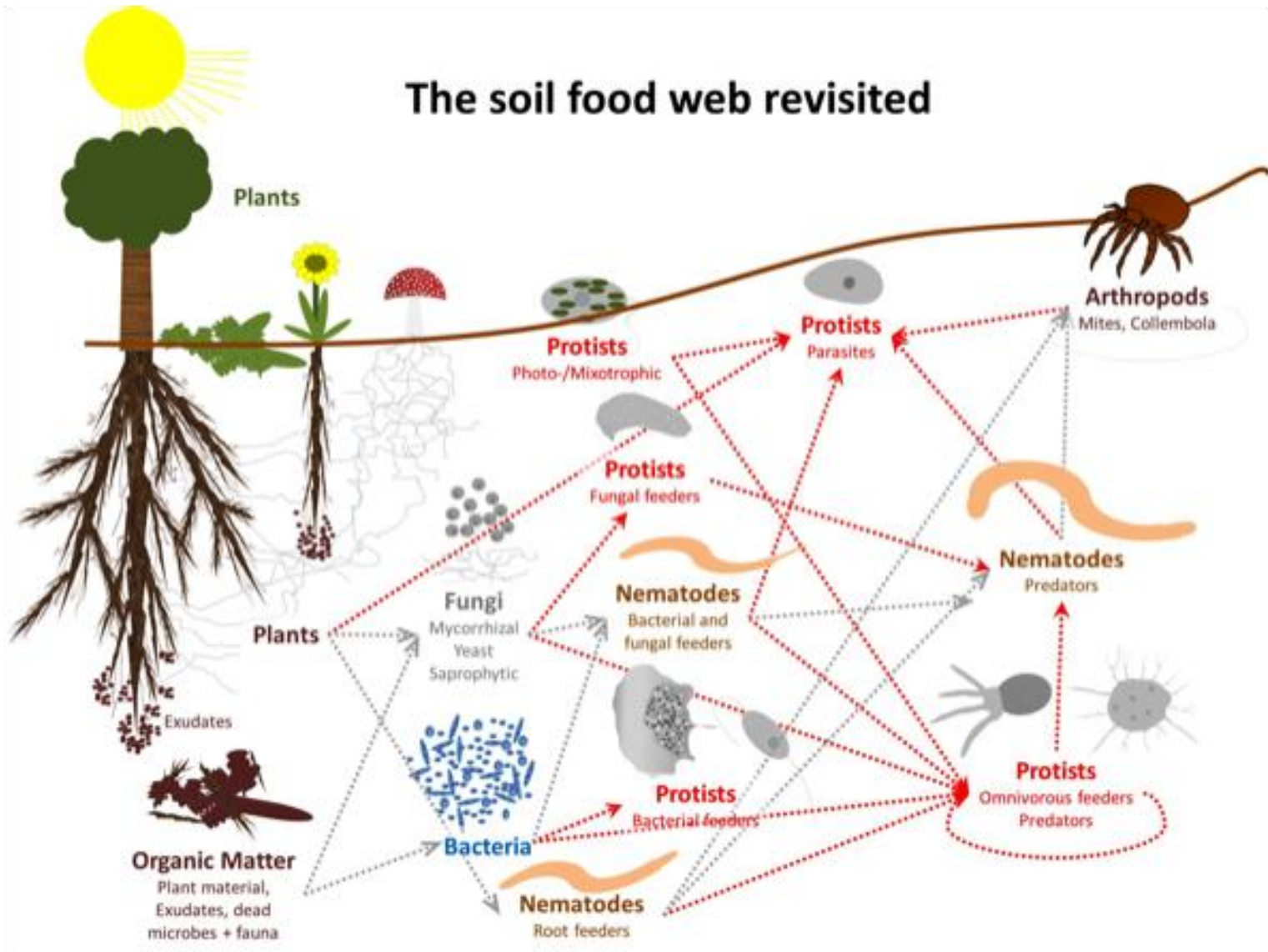


Improving Soil Structure

- Add compost to top 6 to 8 inches of soil prior to planting
 - Well composted
 - 1/2 to 3/4 inch minus
 - C:N ratio of less than 20
- Use mulch to prevent compaction
 - 2 inches thick
 - Keep away from crown on plants
- Avoid working soil when wet



The soil food web revisited



Soil Organisms

- Bacteria, Fungi, Actinomicetes and algae
- Earthworms, insects
- Specialized micro-organisms
 - Mycorrhizae
 - Nitrogen fixing bacteria



Soil Humus

- Like clay has the ability to attract water and plant nutrient cations and anions
- Aids in the formation of soil aggregates
- Gives soil its dark brown color



Organic Mulch Reduces Soil Compaction

- Using mulch helps reduce compaction. It acts like a sponge to absorb weight and water
- Shatters rain drops
- Supplies food for microbes, which encourages micro and macro aggregation



Compost Blanket



Chemical Characteristics

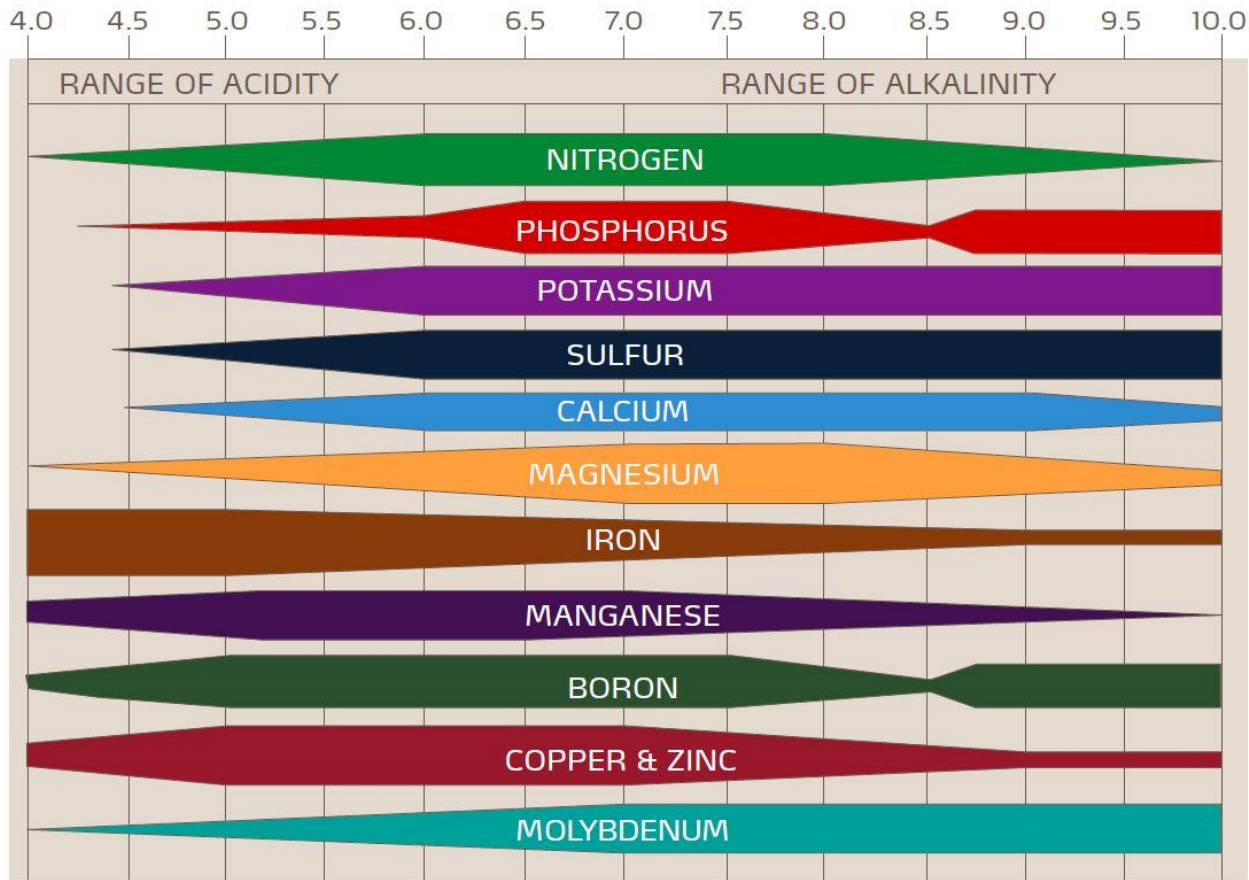
- pH
- Salinity
- Nutrients



Soil pH

Hydrogen Ions in the Soil Solution

The Influence of Soil pH on Nutrient Availability



Macronutrient Deficiency Symptoms

- Nitrogen
 - Overall stunting and slow growth
 - yellowing of plants older leaves
- Phosphorus
 - Overall stunting and slow growth
 - Purplish coloration
 - Poor fruit, root or seed development



Soil & Water Chemistry

Total Salts in the Soil/Water Solution

Beneficial

- Potassium, Calcium , Magnesium
- Sulfates, Nitrates

Damaging

- Sodium
- Chloride
- Boron in excess



Soil Sampling

Your Soil Analysis results are only as good as your sampling technique.

- Sample after finish grading
- Each sample should consist of 12 to 20 cores
- Make sure the lab knows that crop that you are growing



Thanks!



Building Better Soils

