UCCE Organic Agriculture Workshop

December 8, 2022

AGRI SERVICE

SUSTAINING THE CYCLES
Organic Recycling
Mulch
Soil Amendments

Healthy Soils
Support
Healthy Plants

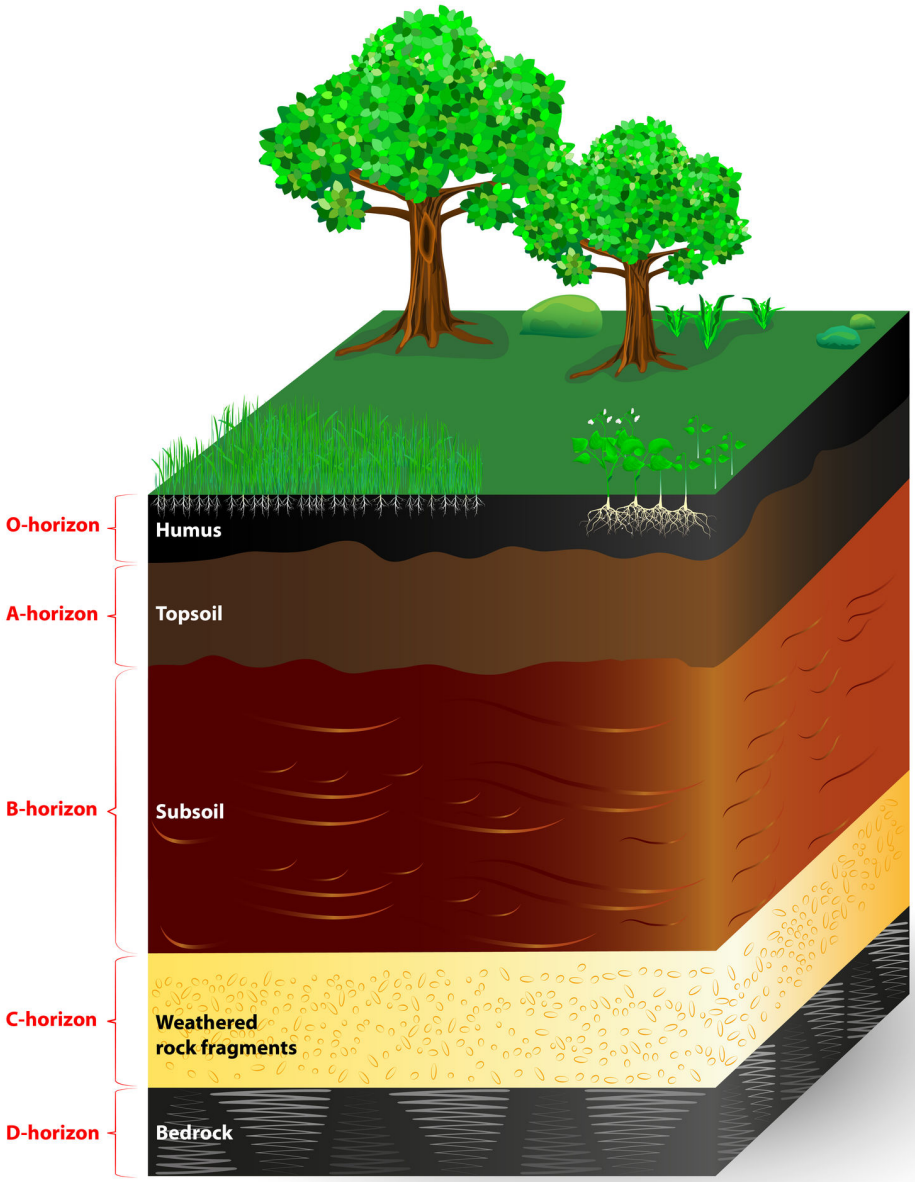
Characteristics of "Healthy Soils"

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

“Unhealthy Soils”

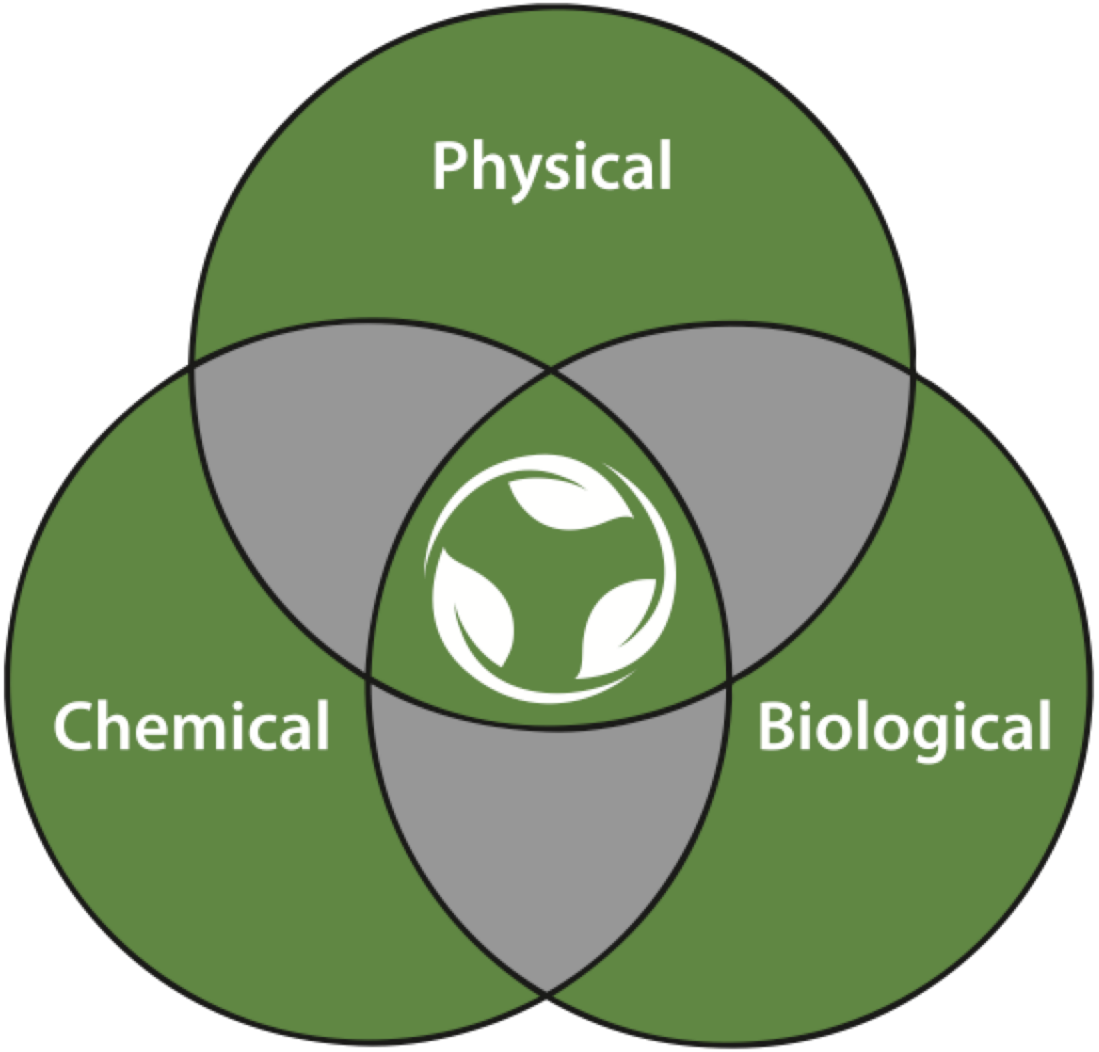
- Compacted, poor structure
- Heavy salt load
- Insufficient organic matter present for good plant growth, increased water holding capacity and to support soil life
- Plants subject to increased pathogen and pest pressure

SOIL LAYERS


O-horizon
Humus
A-horizon
Topsoil
B-horizon
Subsoil
C-horizon
Weathered
rock fragments
D-horizon
Bedrock

Challenges of Arid and Desert Soils

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


Physical
Chemical
Biological

Chemical Characteristics

- pH
- Salinity
- Nutrients

Soil & Water Chemistry

Total Salts in the Soil/Water Solution

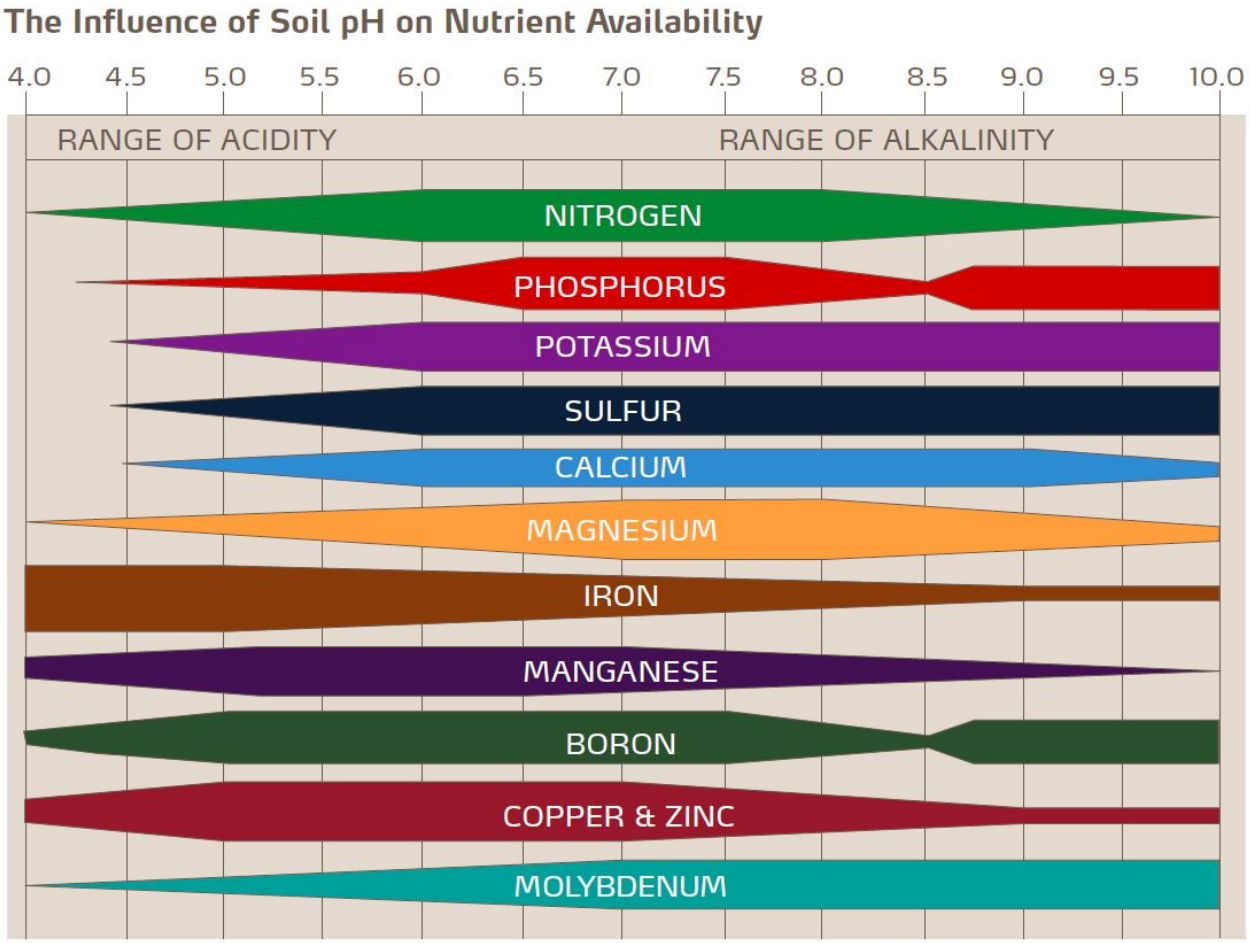
Beneficial

- Potassium, Calcium , Magnesium
- Sulfates, Nitrates

Damaging

- Sodium
- Chloride
- Boron in excess

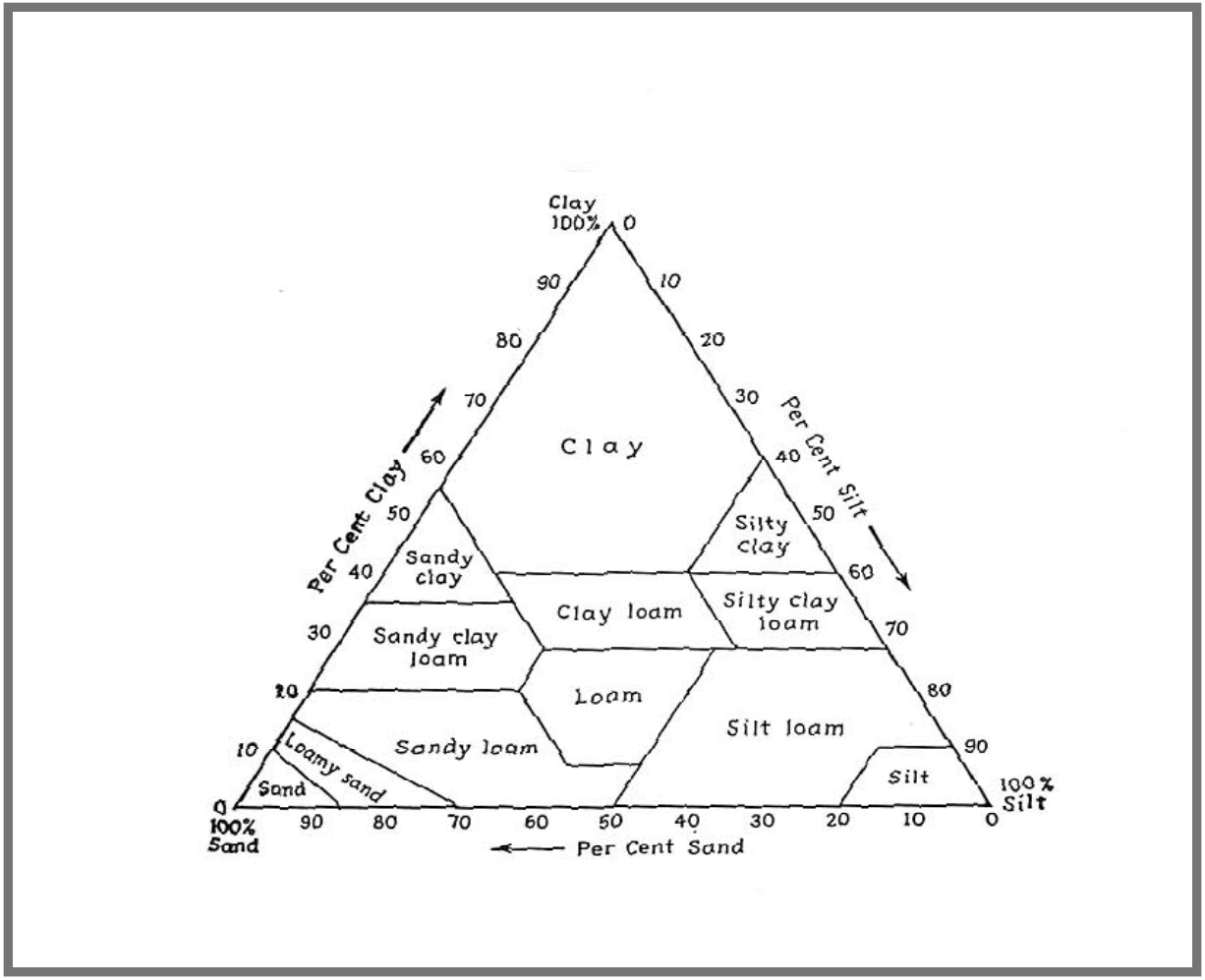
Soil pH
Hydrogen Ions in the Soil Solution



Physical Characteristics

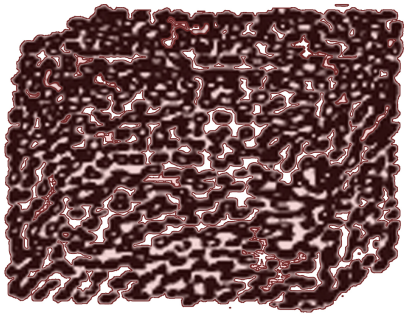
- Texture
  - Percent of Sand, Silt and Clay
  - Percent of Organic Matter
- Structure
  - Arrangement of Particles
- Compaction
- Drainage

Soil Texture

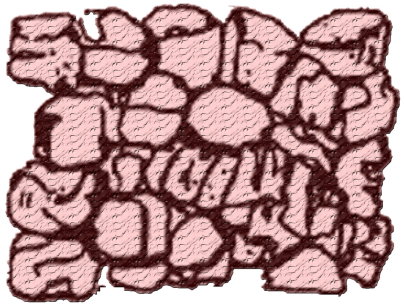


Soil Structure

Single Grain
Rapid Infiltration

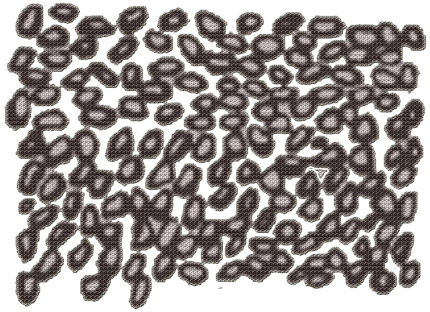


Blocky
Moderate-Slow infiltration

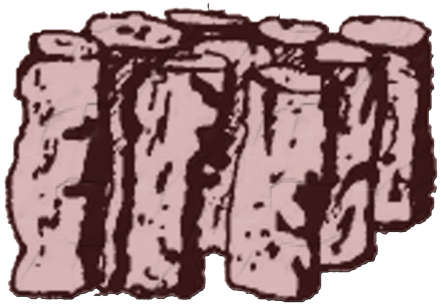


Platy
Slow-Very Slow Infiltration

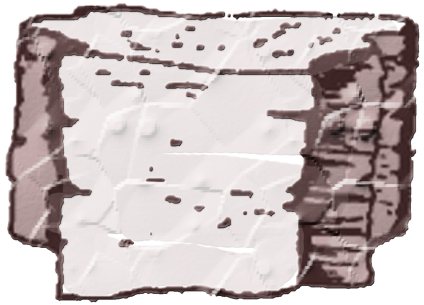
Granular
Rapid-Moderate Infiltration



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

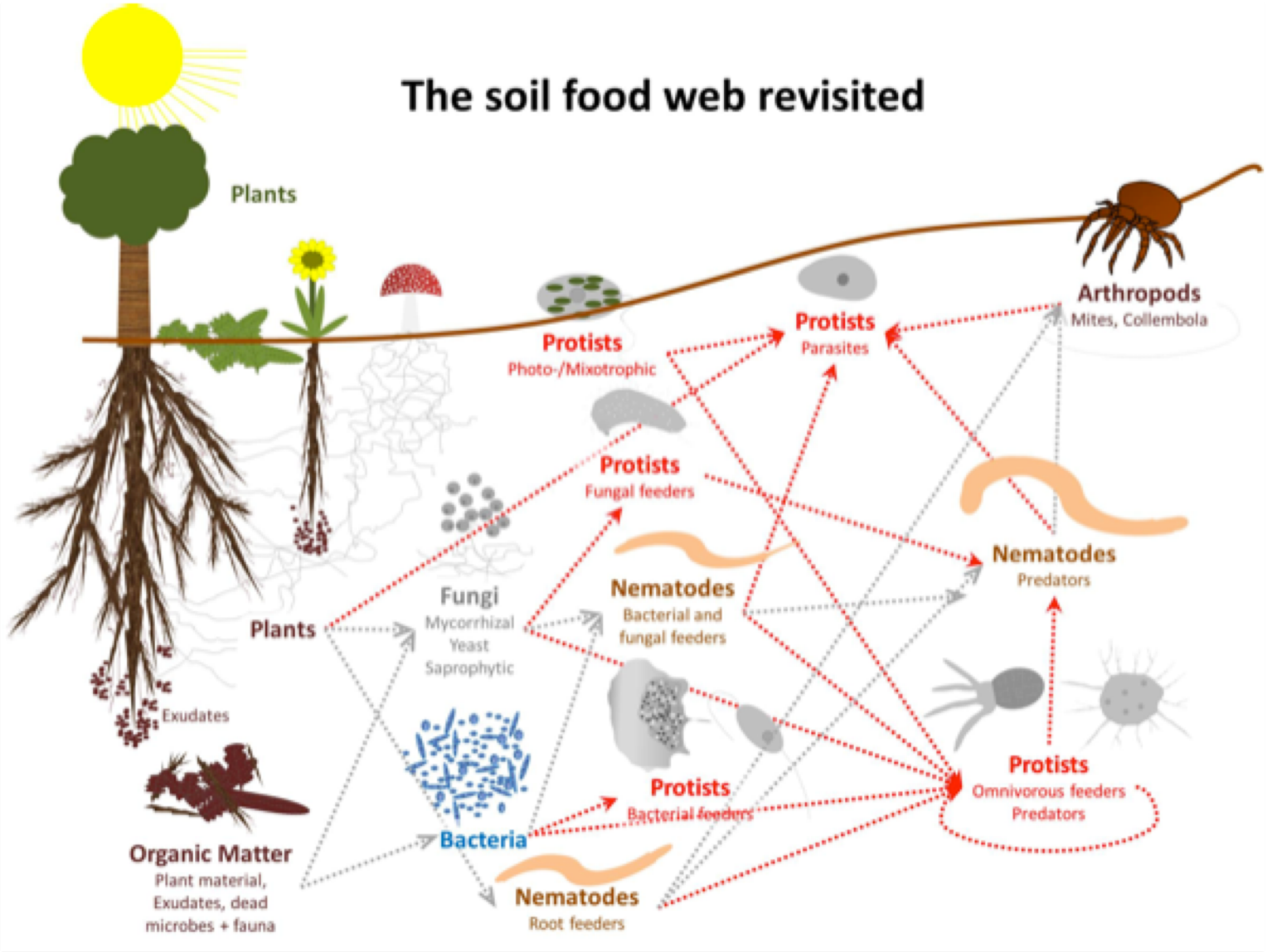
Macro-Aggregates

- 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


The soil food web revisited
Plants
Protists
Photo-/Mixotrophic
Protists
Parasites
Arthropods
Mites, Collembola
Protists
Fungal feeders
Nematodes
Predators
Nematodes
Bacterial and
fungal feeders
Fungi
Mycorrhizal
Yeast
Saprophytic
Plants
Exudates
Protists
Omnivorous feeders
Predators
Protists
Bacterial feeders
Bacteria
Organic Matter
Plant material,
Exudates, dead
microbes + fauna
Nematodes
Root feeders

Biological Disease Control

- Antagonistic
- Competitive

Improving Soils with Organics

- Compost
- Mulch
- Compost Tea

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

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 you are planting drought/salt tolerant plants

Healthy Soils
Support
Healthy Communities

Thanks!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