MAJOR SOIL COMPONENTS

Air 25%
Mineral 45%
Water 25%
Organic 5%

QUASI SOIL PHYSICAL PROPERTIES - SOIL WATER

• Infiltration – Movement of water into the soil.
• Percolation, permeability or hydraulic conductivity – Downward movement of water with the soil.
• Pore space is the conduit that allows water to infiltrate and percolate

QUASI SOIL PHYSICAL PROPERTIES - SOIL WATER

• Medium textured soils (Fine sandy loam, silt loam and silty clay loam) (2.00 – 2.50 in/ft)
• Course textured soils (sand, loamy sands, and sandy loam) (0.25-0.75 in/ft)
• Fine textured soils – held tightly (Clay (1.20 – 1.50 in/ft)

Factors Controlling Water Flow

Coarser soils:
• Large pores hold water less tightly
• Faster water movement
• Less surface area (sorption)

Finer soils:
• Small pores hold water more tightly
• Slower water movement
• More surface area (sorption)
QUASI SOIL PHYSICAL PROPERTIES – SOIL AERATION

Soil Aeration

O₂ → H₂O

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Soil Color

- Easily identified property.
- Used to relate chemical/physical properties such as water table depth, drainage, chemical constituents, formation, horizons.

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Color Description Example

- 19R—40 to 65 centimeters: yellowish brown (10YR 5/6) loamy sand; common medium and coarse distinct yellowish brown (10YR 5/8) moist irregular redox concentrations throughout, common medium prominent strong brown (7.5YR 5/8) moist irregular redox concentrations throughout, and common medium faint brownish yellow (10YR 6/6) moist irregular redox concentrations throughout.
- 2Cr—38.8 to 55.2 inches: olive gray (5Y 3/2) silt loam; common medium prominent strong brown (7.5YR 5/8), irregular redox concentrations throughout and common coarse prominent light olive brown (7.5Y 5/6), irregular redox concentrations throughout.

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Coloring Agents in Soil

- Organic Matter (carbon): Very strong coloring agent. Makes soil dark or black colored such as in an A horizon or topsoil.
- Compounds and elements: Such as iron, sulfur, manganese, etc. Iron is a dominant element in soils, when well aerated iron-oxides (rust) coat particles giving the soil a yellowish-brown to reddish color. Manganese oxides are purplish-black color.

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SOIL STRUCTURE

- Granular
- Crumb
- Blocky
- Subangular blocky
- Platy
- Pissmatic
- Columnar
- Single-grain structureless

Importance of Soil Structure
- Influence bulk density, porosity and pore size.
- Pores within an aggregate are quite small as compared to pores between aggregates and between single soil particles.
- Balance of large and small pores provide good soil aeration, permeability and water-holding capacity.

Natural Processes that Aid in Forming Aggregates
- Freezing and thawing
- Microbial activity that aids in the decay of organic matter
- Wetting and drying of the soil
- Activity of roots and soil animals
- Adsorbed cations

BULK DENSITY – POROSITY – PORE SIZE
- Bulk Density – dry weight of soil per unit volume of soil. (g/cm³)
- Porosity – volume of soil voids which can be filled by water and/or air
- Pore Size - Aeration is needed for the exchange of oxygen from the atmosphere and carbon dioxide given off by plant roots and microorganisms
QUASI SOIL PHYSICAL PROPERTIES - TEMPERATURE

- Impacts chemical & biological reactions
- Time lag
- Water content affects temp change - > heat to warm wet soil than dry – evaporation.
- Sunlight
- Frost
- Color – Slope – Vegetative cover