SOIL - Fundamental Concepts

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SOIL

- Geologic definition: Loose surface of the earth as distinguished from solid bedrock (support of plant life not required).

SOIL

- Traditional definition: Material which nourishes and supports growing plants (includes rocks, water, snow, air).

SOIL

- Component definition: Mixture of mineral matter, organic matter, water, and air.

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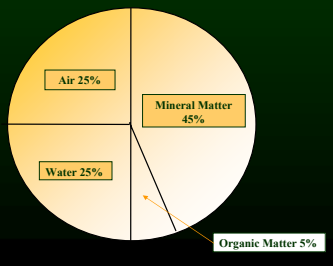
- Example:

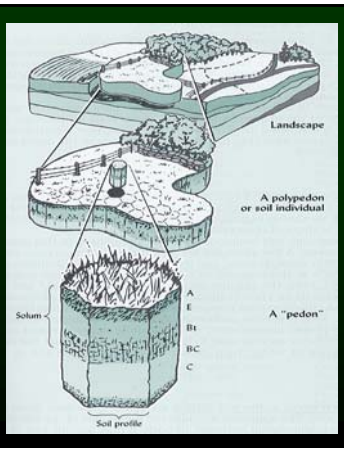


SOIL

- Soil Taxonomy definition: Collection of natural bodies of the earth's surface, in places modified or even made by man or earthy materials, containing living matter and supporting or capable of supporting plants out of doors. (Its upper limit is air or shallow water and its lower limit is the depth to which soil weathering has been effective.)

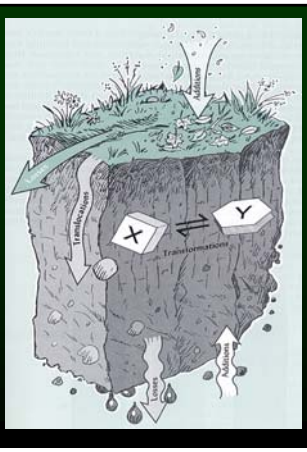
SOIL

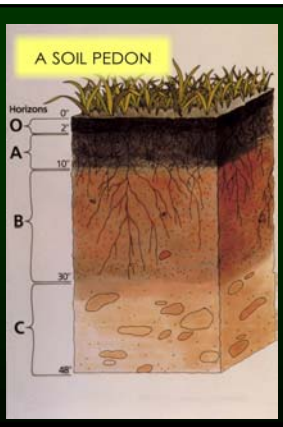
- As a portion of the landscape: Collection of natural bodies occupying portions of the earth's surface that support plants and that have properties due to the integrated effect of climate and living matter, acting upon parent material, as conditioned by relief, over periods of time.



Soil Forming Processes

- Translocations
- Transformations
- Additions
- Losses





Major Components

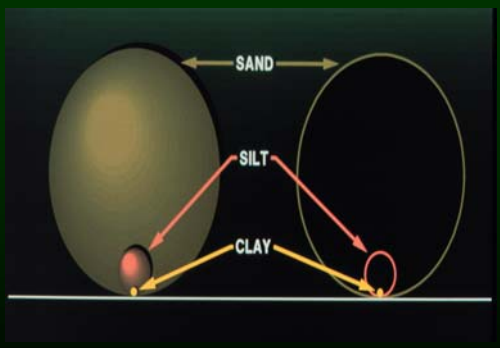
- Mineral matter
- Organic matter
- Air
- Water

Physical Properties of Soil

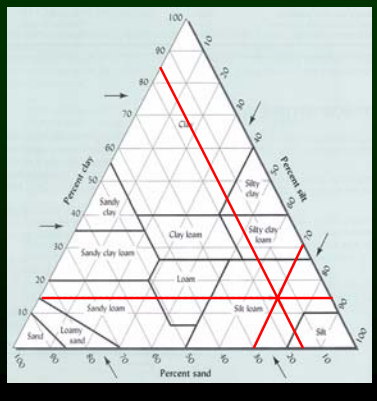
- Soil texture
- Soil structure
- Soil color
- Bulk density

Three Fractions of Mineral Matter

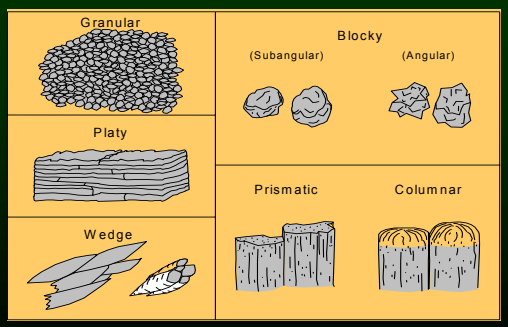
- Sand
- Silt
- Clay



USDA Textural Triangle



Examples of Soil Structure



Aspects of Soil Structure

- The arrangement into aggregates of desirable shape and size
- The stability of the aggregate
- The configuration of the pores

Factors that Affect Aggregate Stability

- Kind of clay
- Chemical elements associated with the clay
- Nature of the products of decomposition or organic matter
- Nature of the microbial population

Factors that Affect Soil Structure

- Kind of clay
- Amount of organic matter
- Freezing and thawing
- Wetting and drying
- Action of burrowing organisms
- Growth of root systems of plants

Important Note

- All of these have a loosening effect on the soil, but they have no effect on aggregate stability

Bulk Density

- Determined by dividing the weight of oven-dry soil in grams by its volume in cubic centimeters
- The variation in bulk density is due largely to the difference in total pore space

Effects of Bulk Density

- Engineering properties
- Water movement
- Rooting depth of plants

Soil Color

- Indicator of different soil types
- Indicator of certain physical and chemical characteristics
- Due to humus content and chemical nature of the iron compounds present in the soil

Major Forms of Iron and Effect on Soil Color

Form	Chemical Formula	Color
Ferrous oxide	FeO	Gray
Ferric oxide (Hematite)	Fe_2O_3	Red
Hydrated ferric oxide (Limonite)	$2Fe_2O_3 \cdot 3H_2O$	Yellow