



Digging Into Soil

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Soil Summary

Soils are complex mixtures of minerals, water, air, organic matter, and countless organisms that are the decaying remains of once-living things. It forms at the surface of land it is the “skin of the earth.” Soil is capable of supporting plant life and is vital to life on earth

What is soil?





Soil Texture Chart

LAYERS OF SOIL

Humus or Organic

Decomposing leaves and lots of organic matter

Color: black





Topsoil

Contains lots of roots and minerals for growing plants

Color: rich brown





Eluviation layer

The transport of soil material from upper layers of soil to lower levels by downward precipitation of water across soil horizons, and accumulation of this material (illuvial deposit) in lower levels is called illuviation.

Color: light brown



E Horizon or the Eluviation Layer

This eluviation (leaching) layer is light in colour; this layer is beneath the A Horizon and above the B Horizon. It is made up mostly of sand and silt, having lost most of its minerals and clay as water drips through the soil (in the process of eluviation).



Subsoil

Subsoil layers are important to crop production, pasture management, forest growth, soil conservation, and the construction of highways and airport runways. The subsoil may contain some broken down organic matter but it is mostly made of weathered rocks and clay minerals. Plants send their roots into both of these layers to find water stored in the soil and to find nutrients that they need to grow and to use for photosynthesis.

Color: Yellowish brown





Parent Rock

Parent rock, also referred to as substratum, refers to the original rock from which something else was formed. It is mainly used in the context of soil formation where the parent rock (or parent material) normally has a large influence on the nature of the resulting soil.

Color: grey





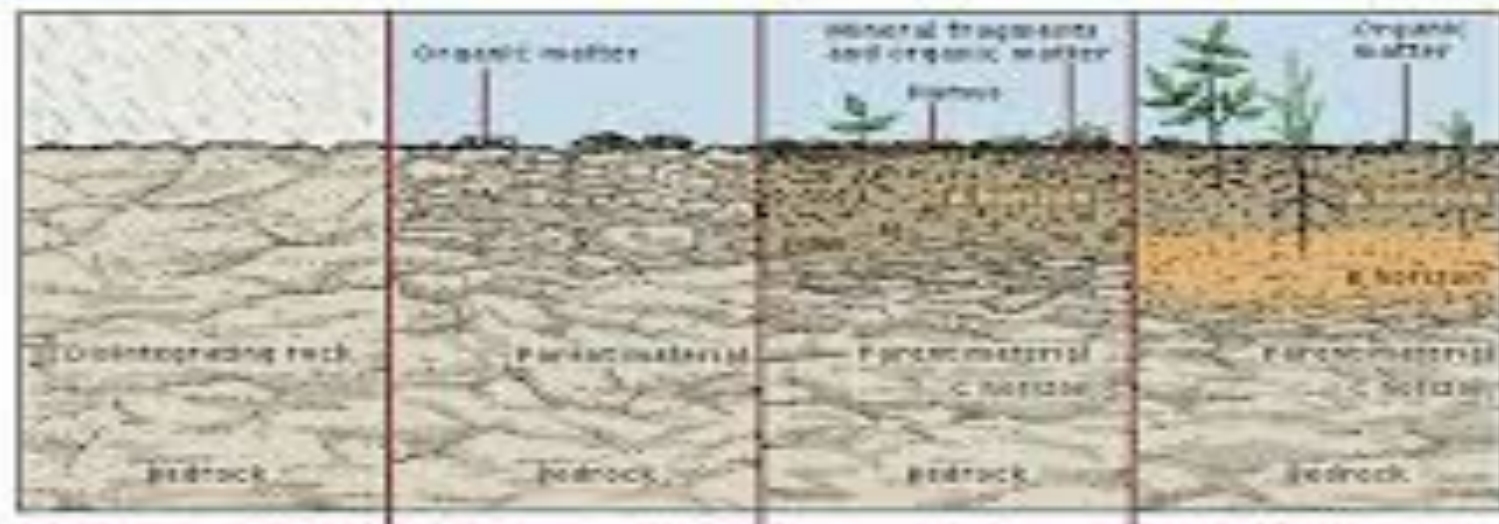
Bedrock

Bedrock, a deposit of solid rock that is typically buried beneath soil and other broken or unconsolidated material (regolith). Bedrock is made up of igneous, sedimentary, or metamorphic rock, and it often serves as the parent material (the source of rock and mineral fragments) for regolith and soil.

Color: dark brown, black, or grey



Soil formation begins with weathering of bedrock



bedrock begins to disintegrate

I

organic materials facilitate disintegration

II

horizons form

III

developed soil supports thick vegetation

IV



Layers of soil chart

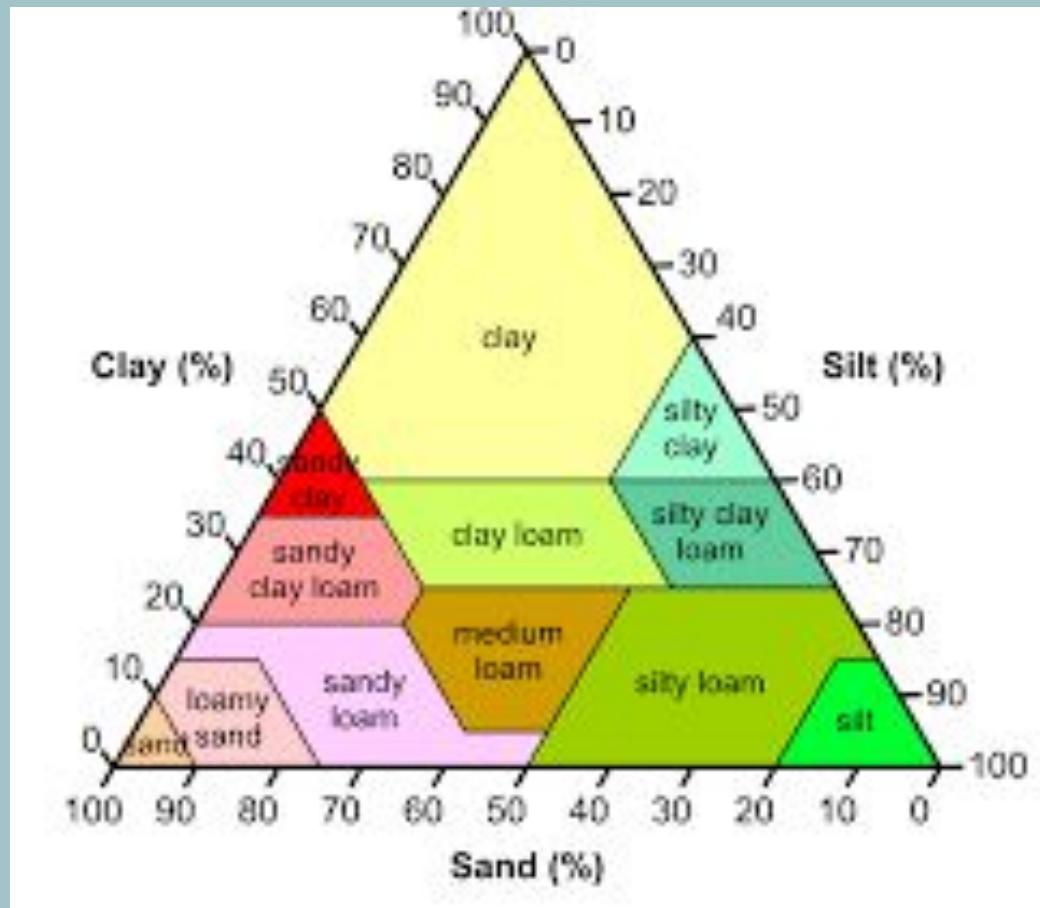
Three major types

- SAND: Sand is the largest in particle size.
- SILT: Silt is just sand, but smaller.
- CLAY: Clay has even smaller particles than silt.

Factors of soil

Soils are formed through the interaction of five major factors: time, climate, parent material, topography and relief, and organisms. The relative influence of each factor varies from place to place, but the combination of all five factors normally determines the kind of soil developing in any given place.

Triangle chart:



Major Macronutrients:

In relatively large amounts, the soil supplies nitrogen, phosphorus, potassium, calcium, magnesium, and sulfur; these are often called the macronutrients.

Less macronutrients:

In relatively small amounts, the soil supplies iron, manganese, boron, molybdenum, copper, zinc, chlorine, and cobalt, the so-called micronutrients.

The 7 micronutrients needed for healthy plant growth

There are 7 essential plant nutrient elements defined as micronutrients [boron (B), zinc(Zn), manganese (Mn), iron (Fe), copper (Cu), molybdenum (Mo), chlorine (Cl)]. They constitute in total less than 1% of the dry weight of most plants. The Three of these macronutrients are the most important elements for crops. Nitrogen, phosphorus, and potassium directly affect plant growth and practically create plant parts.

Primary Macronutrients

Plants get some of the required macronutrients from the soil it grows in, while other nutrients are obtained from fertilizer. Nitrogen, phosphorus and potassium are sometimes called the "fertilizer elements" because they are the familiar "N-P-K" identified on fertilizer labels. The macronutrients: nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), sulfur (S), magnesium (Mg), carbon (C), oxygen (O), hydrogen (H).

How are primary macronutrients used in plants?

Macronutrients include carbon, hydrogen, nitrogen, oxygen, phosphorous, potassium, calcium, sulfur, and magnesium. A plant uses these nutrients to support its growth, life cycle, and biological functions.

PRIMARY MACRONUTRIENTS

Nutrient	Influence/Function	Deficiency Symptom
Nitrogen	Produces stem and leaf growth; gives plants dark green color; synthesis of amino acids and proteins	Entire plant lighter green, lower leaves yellowing; slow or dwarfed growth
Phosphorus	Stimulates root development and growth; aids in cell division; encourages flower bud formation; improves winter hardiness; helps plants to a vigorous and rapid start	Purplish coloration to leaves and stems; stunted growth
Potassium	Increases plant vigor and disease resistance; aids in the transport of foods through the phloem; has key role in opening and closing stomata; thickens cell walls	Yellowing or death of tissues at tips and outer edges of older leaves

6 MACROnutrients again:

N - Nitrogen

Ca - Calcium

P - Phosphorus

Mg - Magnesium

K - Potassium

S - Sulfur

"Holy MACRO!"
Never Punch Kittens, they'll



How to make and prepare good soil

Adding organic matter in the form of compost and aged manure, or using mulch or growing cover crops (green manures), is the best way to prepare soil for planting. Adding chemical fertilizers will replenish only certain nutrients and do nothing for maintaining good, friable soil.

How is a soil sample done

Form Plant nutrition, In agriculture, a soil test commonly refers to the analysis of a soil sample to determine nutrient content, composition, and other characteristics such as the acidity or pH level. Composite sampling can be performed by combining soil from several locations prior to analysis.

ATSDR

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How to Collect a soil sample

Reference slide

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