

Video Guide: Soil Origin and Classification

Soil Origin and Development

1. Describe how physical and chemical weathering differ.

Physical weathering is the result of things like temperature or erosion, while chemical weathering is the result of chemical reactions like redox, hydrolysis, hydration, or dissolution.

2. Describe how igneous, sedimentary, and metamorphic rock is created.

Igneous rock is the result of magma that has cooled and solidified. Sedimentary rock is formed as mineral sediment particles (for example in riverbeds) collect and are crystallized with pressure or temperature. Metamorphic rock is formed when sedimentary and/or igneous rock are exposed to heat and pressure.

3. Describe how the following types of parent material formed and where in the US they would be found:
 - a. Glacial till – **Materials deposited by glacial movement, they would be found in the northern US, often near bodies of water**
 - b. Loess or Eolian – **Materials deposited by wind movement, used as agricultural soil in the midwest**
 - c. Alluvium – **Materials deposited by water movement. This can include floodplains and deltas, and they are common in the east and gulf coast states.**
 - d. Lacustrine – **Materials are deposited by a lake. A lot of these are the result of glacial activity and also tend to be in the northern US, although lake Bonneville in Utah is an example as well.**
 - e. Marine – **Materials are deposited by the ocean. These are common in coastal states.**
 - f. Colluvium – **Materials are deposited by gravity. These are common around mountains.**
 - g. Volcanic or Tephra – **Volcanic ash carried by wind turns into tephra. This type of rock occurs near volcanic activity, and can be found in the pacific northwest, Hawaii, and Alaska.**
 - h. Organic – **These often form in lakes when organic matter piles up and the stuff in the most anaerobic layer towards the bottom gets compacted. These are very common in the southeast, the midwest, and Alaska.**

4. Describe how climate affects organic matter production.

Warm temperatures typically speed up plant growth, but they also provide a favorable environment for decomposers like bacteria. Because of this, organic matter tends to decay quickly in warm environments and as a result soil organic matter content is low. In cold climates, vegetation takes longer to grow but also takes longer to decay.

5. Describe the difference in organic matter of prairies, deciduous forests, and conifer forests.

Prairies tend to form deep layers of rhizome and fibrous roots due to the heavy grass vegetation. Deciduous forests tend to have less organic matter in the soil and have shallower topsoils, since the layers do not mix. Conifer forests typically have thin, acidic, low organic matter topsoils.

6. Describe how the soil differs in the five areas along a hill.

At the top of a hill, there tends to be better drainage and thicker soil. On the hillside, erosion is higher which leads to less soil development. On the toeslope, the soil tends to be more hydrated. Soil in the valley tends to be rich due to sediment and water accumulation. The soil on the near hillside is north facing so it is cooler, and supports conifer growth.

7. Describe the six soil horizons (letter and layer).

O – organic layer

A – topsoil

E – eluviation

B – subsoil

C – parent material

R - bedrock

Soil Classification and Survey

1. Describe a soil series when it comes to soil classification.

A soil series is the smallest soil taxonomic group, having the most specific features.

2. Describe each of the 12 soil orders.

a. Alfisols – **deciduous forests with moderate temperature and lots of moisture**

b. Andisols – **the result of relatively recent volcanic activity, holds lots of water, and has high organic matter content**

- c. Aridisols – **arid climates such as shrublands and deserts**
- d. Entisols – **recently or poorly developed soil without distinct horizons**
- e. Gelisols – **cold soils from areas such as tundras, contains permafrost in the subsoil**
- f. Histosols – **form under decaying organic matter in wetlands, 20-30%+ organic matter**
- g. Inceptisols – **young soil but more developed than entisols**
- h. Mollisols – **soft grassland soil, formed with moderate to low rainfall but very rich and favorable for agriculture**
- i. Oxisols – **high iron oxide content gives reddish color, a common tropical soil**
- j. Spodosols – **often in coniferous forests lacking an A horizon, often acidic due to coniferous matter**
- k. Ultisols – **Weathered soils from warm humid climates, not as weathered as oxisols**
- l. Vertisols – **high clay parent materials that expand and shrink with moisture lead to distinct layers**

3. Describe what a soil survey is.

A soil survey is an effort to classify and describe soil at a location, indicating what possible uses it may have.

4. Identify what land capability classes would be used with cultivated crops such as row crops.
Soil classes 1 and 2 are ideal for row crops.

5. Identify what the land capability subclasses (e, w, s, c) signify.

E – indicates susceptibility to runoff and erosion

W – main limitation is excess moisture

S – main limitation is root zone composition (stones in the soil, too salty)

C – main limitation is extreme weather