

# **Unit E: Basic Principles of Soil Science**

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## **Lesson 5: Explaining a Soil Profile**

# Important Terms

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- Additions
  - Eluviation
  - Illuviation
  - Losses
  - Soil profile
  - Solum
  - Subsoil
  - Substratum
  - Topsoil
  - Transformations
  - Translocations
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# What is a soil profile?

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- A soil profile is a vertical cross-section of the soil.
- When exposed, various layers of soil should be apparent.

# What is a soil profile?

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- Each layer of soil may be different from the rest in a physical or chemical way.
  - The differences are developed from the interaction of such soil-forming factors as:
    - Parent material
    - Slope
    - Weathering (time)
    - Climate
    - Native vegetation

# What is a soil profile?

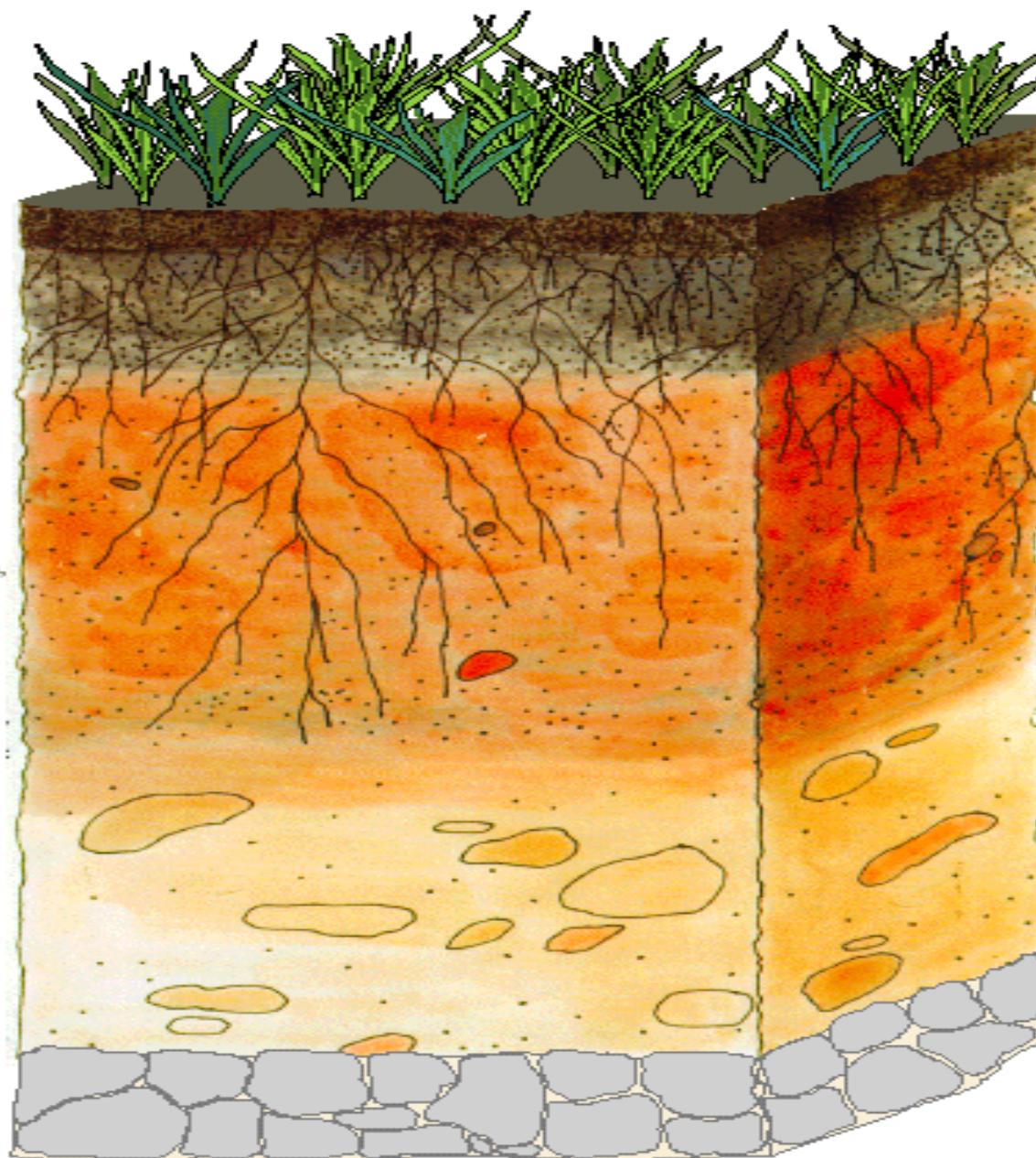
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- A soil profile is usually studied to a depth of .9 to 1.5 meters.

# Primary Layers of a Soil Profile

## HORIZONS

O	Surface litter
A	Topsoil: humus, roots, organisms
B	Subsoil: fine particles, leached materials, some roots
C	Parent Material: weathered bedrock and some leached materials
R	Bedrock: underlying solid rock



# How do soils within a soil profile change over time?

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- Soils change over time in response to their environment.
  - The environment is influenced by the soil-forming factors.
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# How do soils within a soil profile change over time?

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- The causes of these changes can be classified into 4 processes:
  - Additions. Materials such as fallen leaves, wind-blown dust, or chemicals from air pollution that may be added to the soil.
  - Losses. Materials may be lost from the soil as a result of deep leaching or erosion from the surface.

# How do soils within a soil profile change over time?

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- The causes of these changes can be classified into 4 processes:
  - Translocations. Materials may be moved within the soil.
    - This can occur with deeper leaching into the soil or upward movement caused by evaporating water.

# How do soils within a soil profile change over time?

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- The causes of these changes can be classified into 4 processes:
    - Transformations. Materials may be altered in the soil.
      - Examples include organic matter decay, weathering of minerals to smaller particles, or chemical reactions.
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# How do soils within a soil profile change over time?

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- Each of these processes occurs differently at various depths.
  - As a soil ages, horizontal layers develop and changes result.
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# **Causes of Changes Within a Soil Profile**

- 1. Additions — fallen leaves, dust, chemicals**
- 2. Losses — materials lost due to erosion or leaching**
- 3. Translocation — materials moved within the soil**
- 4. Transformation — materials being altered in the soil**

# What are the major horizons of a soil profile and how do they differ?

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- There are 3 primary soil horizons called master horizons.
    - A Horizon
    - B Horizon
    - C Horizon
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# What are the major horizons of a soil profile and how do they differ?

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- O Horizon.
    - This is an organic layer made up of partially decayed plant and animal debris.
    - It generally occurs in undisturbed soil such as in a forest.
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# What are the major horizons of a soil profile and how do they differ?

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- A Horizon. This is often referred to as topsoil and is the surface layer where organic matter accumulates.
  - Over time, this layer loses clay, iron, and other materials due to leaching.
    - This is called eluviation.
  - The A horizon provides the best environment for the growth of plant roots, microorganisms, and other life.

# What are the major horizons of a soil profile and how do they differ?

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- E Horizon. This is the zone of greatest eluviation.
    - Because the clay, chemicals, and organic matter are very leached, the color of the E horizon is very light.
    - It usually occurs in sandy forest soils with high amounts of rainfall.
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# What are the major horizons of a soil profile and how do they differ?

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- B Horizon. This horizon is referred to as the subsoil.
  - It is often called the “zone of accumulation” since chemicals leached from the A and E horizons accumulate here.
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# B Horizon

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- This accumulation is called illuviation. The B horizon will have less organic matter and more clay than the A horizon.
  - Together, the A, E, and B horizons are known as the solum.
  - This is where most of the plant roots grow.
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# What are the major horizons of a soil profile and how do they differ?

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- C horizon. This horizon is referred to as the substratum.
  - It lacks the properties of the A and B horizons since it is influenced less by the soil forming processes.
  - It is usually the parent material of the soil.
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# What are the major horizons of a soil profile and how do they differ?

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- R Horizon.
  - This is the underlying bedrock, such as limestone, sandstone, or granite.
  - It is found beneath the C horizon.
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# Soil Monolith



# Soil Profile Horizons

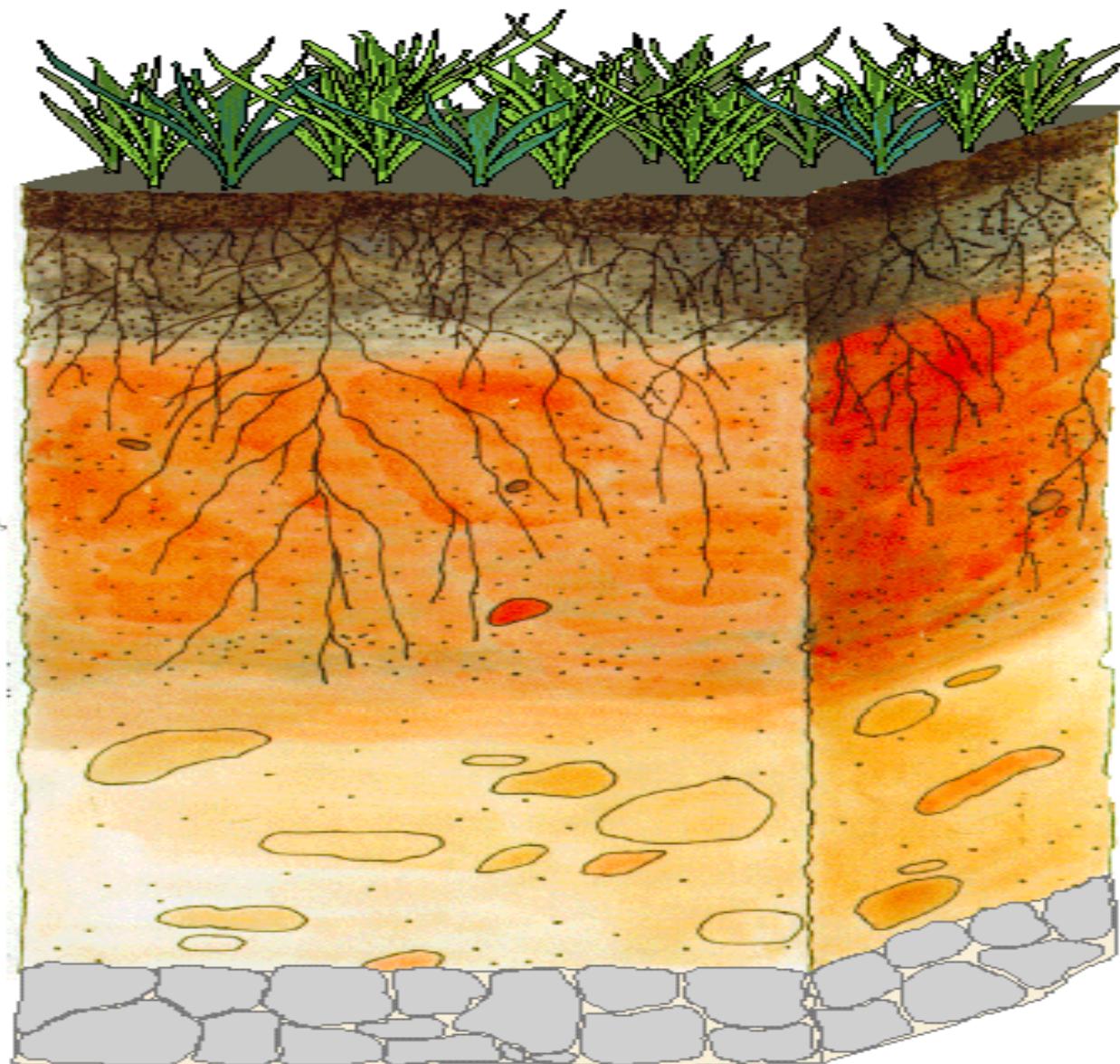
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- O Horizon organic layer of leaves, roots, and decaying material
  - A Horizon Topsoil
  - B Horizon Subsoil
  - C Horizon Substratum
  - R Horizon Bedrock or solid rock below the C Horizon
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# Primary Layers of a Soil Profile

## HORIZONS

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# Review / Summary

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- Explain the soil profile.
  - Explain how soils within the profile change over time.
  - Distinguish between the major horizons of a soil profile.
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