



**DETERMINING THE NATURE OF  
SOIL**

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# Student Learning Objectives

- Explain how the resources soil provides help in supporting life.
- Explain the contents of soil.
- Describe the biological nature of soil.
- Describe the four ways plants use soil.
- Describe some agricultural uses of soil.
- Describe some nonagricultural uses of soil.

# Important Terms

- Capillary water
- Gravitational water
- Hygroscopic water
- Infiltration
- Leaching
- Mineral matter
- Organic matter
- Percolation
- Permeable
- Pore spaces
- Soil aeration
- Tilt

# What is soil and how do its resources help in supporting

- Soil is a layer on the earth's crust that provides a combination of resources.
- These resources allow the growth of plants and animals.
- These resources include:
  - Oxygen needed for adequate root growth.
  - Temperature - soil absorbs heat from the sun.
    - It also loses heat to the atmosphere.
    - This allows satisfactory temperatures for plant growth and seed germination.

# What is soil and how do its resources help in supporting life?

- Water utilized for growth of plants.
- Carbon utilized in the form of organic matter in the soil.
- Nutrients provided as minerals.
  - They are broken down as nitrogen and recycled through decaying material in the soil.

# Why Soils Are Important ?

- Plants grow in soil
- Plants support animal life.
- Plants and animals support human life.






What are the various components found in soil?

- Soil is composed of four primary components.
- They are mineral matter, organic matter, air, and water.
- [Soil Components Video](#)



# What are the various components found in soil?

- In addition, there are numerous living organisms in the soil, such as bacteria, insect larvae, earthworms, and fungi.
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# Four primary components of soil

- **Mineral matter**, which accounts for about 45% of the soil, is partially decomposed rock material.

# Mineral Matter

- It is the sand, silt, and clay that is found in the soil.
- These vary in amount depending on the type of soil.
- The amounts of sand, silt, and clay also determine the soils ability to hold water and provide nutrients.

# Four primary components of soil

- **Organic matter**, which accounts for about 5% of the soil, is partially decomposed plant and animal matter.
  - Most organic matter is from plant leaves, roots, and stems.
  - Organic matter gives soil its dark color.
  - Organic matter contributes to the soil's fertility as well as improved aeration and water holding capacity.

# Four primary components of soil

- **Air** (25% of soil volume) represent the space occupied by air.
  - When soils are wet the amount of air will be less.
  - When soils are dry the amount of air will be more.
  - There is a constant fluctuation in the amount of air and water found in the soil.

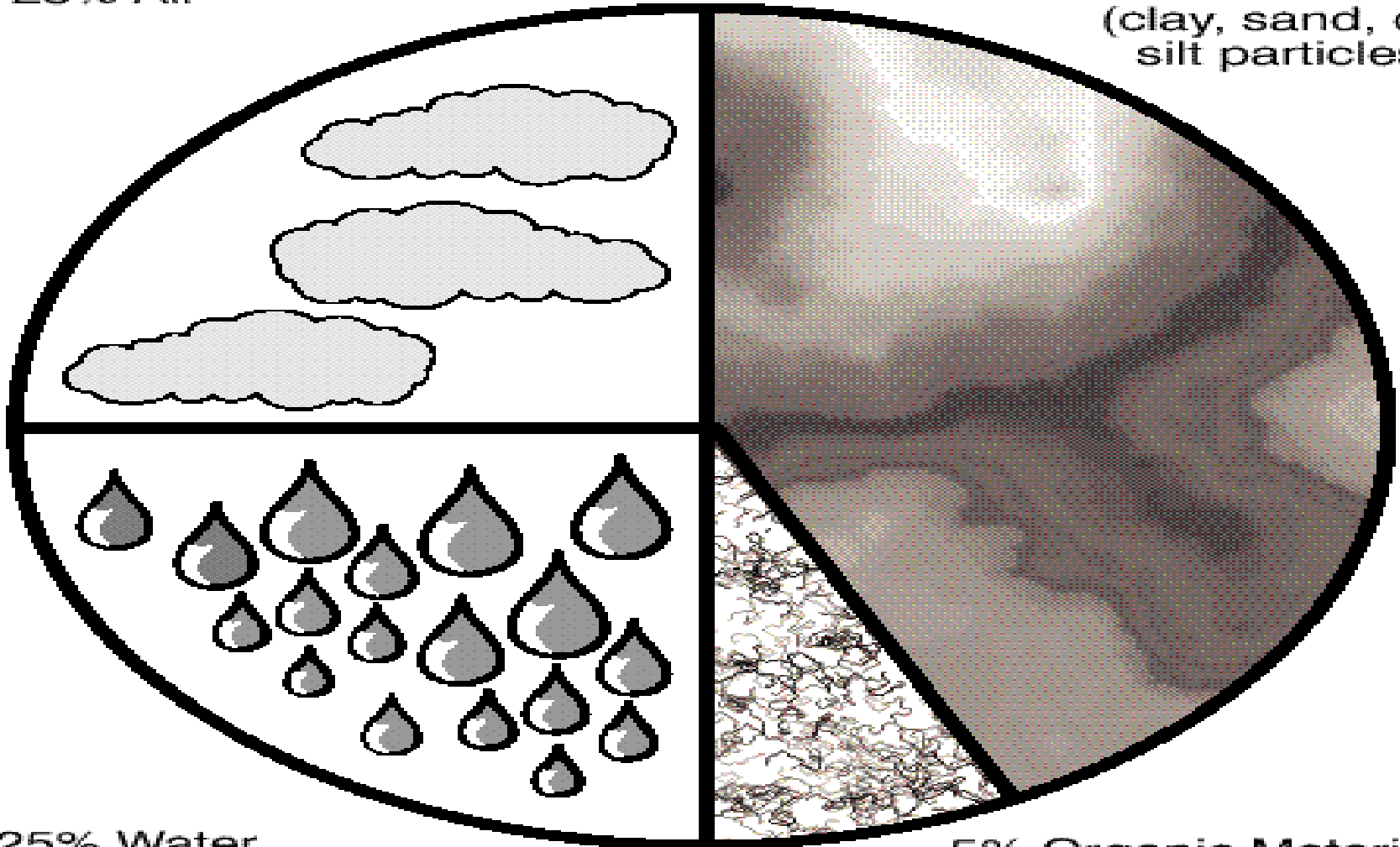
## Four primary components of soil

- **Water**, which accounts for about 25% of the soil, also part of the pore space in the soil.

# Composition of Average Soil

25% Air

45% Mineral Matter  
(clay, sand, or  
silt particles)



25% Water

5% Organic Material  
(living and dead  
plants and animals)

# Water


- When it rains water will enter the soil or flow off of the soils surface.
- The process of water soaking into the soil is known as **infiltration**.
- Once water is in the soil, movement downward is known as **percolation**.
- A quality soil allows both kinds of water movement and is said to be **permeable**.

Water in the soil  
may be one of three types:


- **Gravitational water** - water that drains through the pore spaces in the soil as a result of gravity.

- Large Pores flow fast
- Small Pores flow slow

- Movement of water is referred to as **leaching**.
  - As water moves through the soil, it carries dissolved minerals, chemicals, and salts.



# Water in the soil may be one of three types

- **Hygroscopic water** water that forms a thin film around individual soil particles.
  - This water is unavailable to plants.
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# What living organisms are found in the soil?


Abundant life can be found in soil.

Forms of life in soil include:

- Earthworms
- Insects
- Bacteria
- Fungi
- Other organisms



# What living organisms are found in the soil?

- Bacteria and fungi have an important role in the soil.
  - They break down organic matter and release nutrients.
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What living organisms are found in the soil?

- Earthworms, ants, crawfish, moles, and other organisms
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# How do plants use soil?

- Anchorage: soil acts to provide a firm support as roots grow throughout the soil.
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# How do plants use soil?

- Water: soil provides nearly all of the water used by plants.
  - Water is absorbed through the plants roots.
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# How do plants use soil?

- Oxygen: nearly all living organisms need oxygen.
- Plants release oxygen during photosynthesis but consume oxygen during respiration.

# How do plants use soil?

- Plant parts above the ground have an ample supply of oxygen; however, those below the ground (roots) have less oxygen available.

# How do plants use soil?

- Nutrients: of the 16 nutrients considered to be essential for plant growth, 13 are obtained from the soil.
  - Root hairs absorb the nutrients dissolved in soil water.



# Four Basic Plant Uses of Soil

1. Anchorage

2. Water

3. Oxygen



4. Nutrients

# Review and Summary

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