

# **UNIT E: ORGANIC MATTER IN SOIL**

## **Lesson 1: Organic Matter in Soil**

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# TERMS

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- Organic Matter
- Humus
- Decomposition
- Water Holding Capacity

I. Healthy soil consists of 5% *organic matter*.

A. 90% of all organic matter is found in the top 25 centimeters. The majority of that is in the top 15, where the animal and plant material begin to decompose. The *decomposition* of the material causes the soil to appear very dark. The healthier the soils, the deeper and darker the organic material will be.

1. More organic matter is found in grassland and forest areas. Bare soil, mountainous areas, and arid areas do not have the same organic matter as forests and grasslands.
2. Any part of the soil that is considered to be “weathered” will have some sort of organic matter in the soil.

- II. Organic matter is composed of plant and animal material that is in the process of decomposing.
  - A. Decomposing is to separate into simple components or basic elements.
  - B. Organic Matter has several functions:
    1. Stabilizes soil structure.
    2. Increases water retention and availability.
    3. Increases drainage and aeration.
    4. Increases cation exchange capacity.
    5. Supplies nutrients upon decay (only if low C:N ratio).
    6. Stabilizes pH7.
    7. Food source for microorganisms.

- C. Organic matter that is fully decomposed is called *Humus*.
1. All soil contains varying percentages of decaying matter.
  2. Humus, or the remnants of decaying matter, is long lasting, stable and vital for soil health and plant growth.
  3. Humus absorbs moisture, serving as a reserve for plant roots during times of drought.
    - a. It also shrinks and expands during dry or wet stages, providing air movement for plant roots.

4. Humus provides several important organic acids and trace elements plants need but does not contain nitrogen or phosphorus.
5. Desert sand contains very little humus.
6. Desert or rocky/gravel soils have little or no organic matter and also do not support plant life.
7. Soil that is all decaying matter or humus is called peat and is infertile.

D. Of all the members of the soil food web, earthworms are the major decomposers of dead and decomposing organic matter, and derive their nutrition from the bacteria and fungi that grow upon these materials.

1. They fragment organic matter and make major contributions to recycling the nutrients it contains.
2. Earthworms occur in most temperate soils and many tropical soils.
  - a. They are divided into 23 families, more than 700 genera, and more than 7,000 species.
  - b. They range from an inch to two yards in length and are found seasonally at all depths in the soil.
3. In terms of biomass and overall activity, earthworms dominate the world of soil invertebrates, including arthropods.

4. Earthworms dramatically alter soil structure, water movement, nutrient dynamics, and plant growth.
  - a. They are not essential to all healthy soil systems, but their presence is usually an indicator of a healthy system.



III. There are many ways that plants use organic matter found in soil.

- A. Adding organic matter to sandy soil adds more water holding capacity to that soil.
  - 1. *Water holding capacity* helps the plants by providing extra water for the plant roots to uptake for growth.
  - 2. Sandy soil does not hold very much water naturally so anything that can be added to the soil to increase that is beneficial.
- B. Organic matter has important nutrients that are needed for plants to grow including nitrogen and other important elements.
  - 1. Nitrogen, phosphorous, and potassium are most beneficial for plants and are greatly increased with more organic matter.
- C. Organic matter helps break soil up as well as helping prevent soil compaction.

# REVIEW/SUMMARY

1. Where is organic matter found in the soil?
2. What are some examples of organic matter found in the soil.
3. How do earthworms aid in the decomposition of organic matter?
4. How does organic matter benefit plant growth?