

Unit B: Establishing a Fruit Garden

**Lesson 1: Recognizing the Characteristics of
Soils and the Soil Requirements for
Fruit and Nut Crops**

Terms

- Mineral matter
- Organic matter
- Pore spaces
- Tilth
- Hygroscopic water
- Soil aeration

I. Soil is a layer on the earth's crust that provides a combination of resources. These resources allow the growth of plants and animals.



- A. Oxygen—needed for adequate root growth.
- B. Temperature—determined by the amount of heat the soil absorbs from the sun and the amount it loses to the atmosphere.
Temperatures within a particular range are needed for plant growth and seed germination.

- C. Water—utilized for growth of plants.
- D. Carbon—utilized in the form of organic matter in the soil.
- E. Nutrients—provided as minerals. Nitrogen is one mineral made available and recycled through decaying material in the soil.

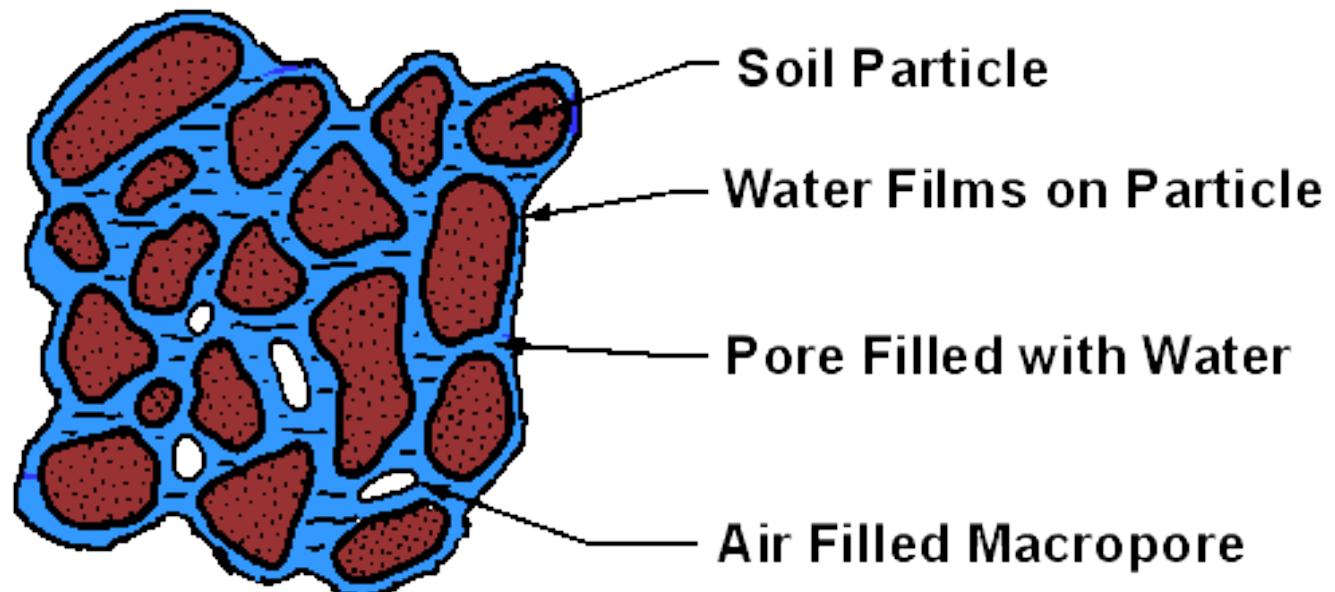
II. Soil is composed of four primary components. They are mineral matter, organic matter, air, and water. In addition, there are numerous living organisms in the soil, such as bacteria, insect larvae, earthworms, and fungi. Soils may vary from one area to another, but most will contain these basic components.

A. Solid portions (50 percent of soil volume) represent the space occupied by mineral and organic matter.

1. *Mineral matter*, which accounts for about 45 percent of the soil, is inorganic material originating from rock. It is the sand, silt, and clay found in the soil. The amounts of sand, silt, and clay vary depending on the type of soil. The amounts also determine the soil's ability to hold water and provide nutrients.

2. *Organic matter*, which accounts for about 5 percent 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.

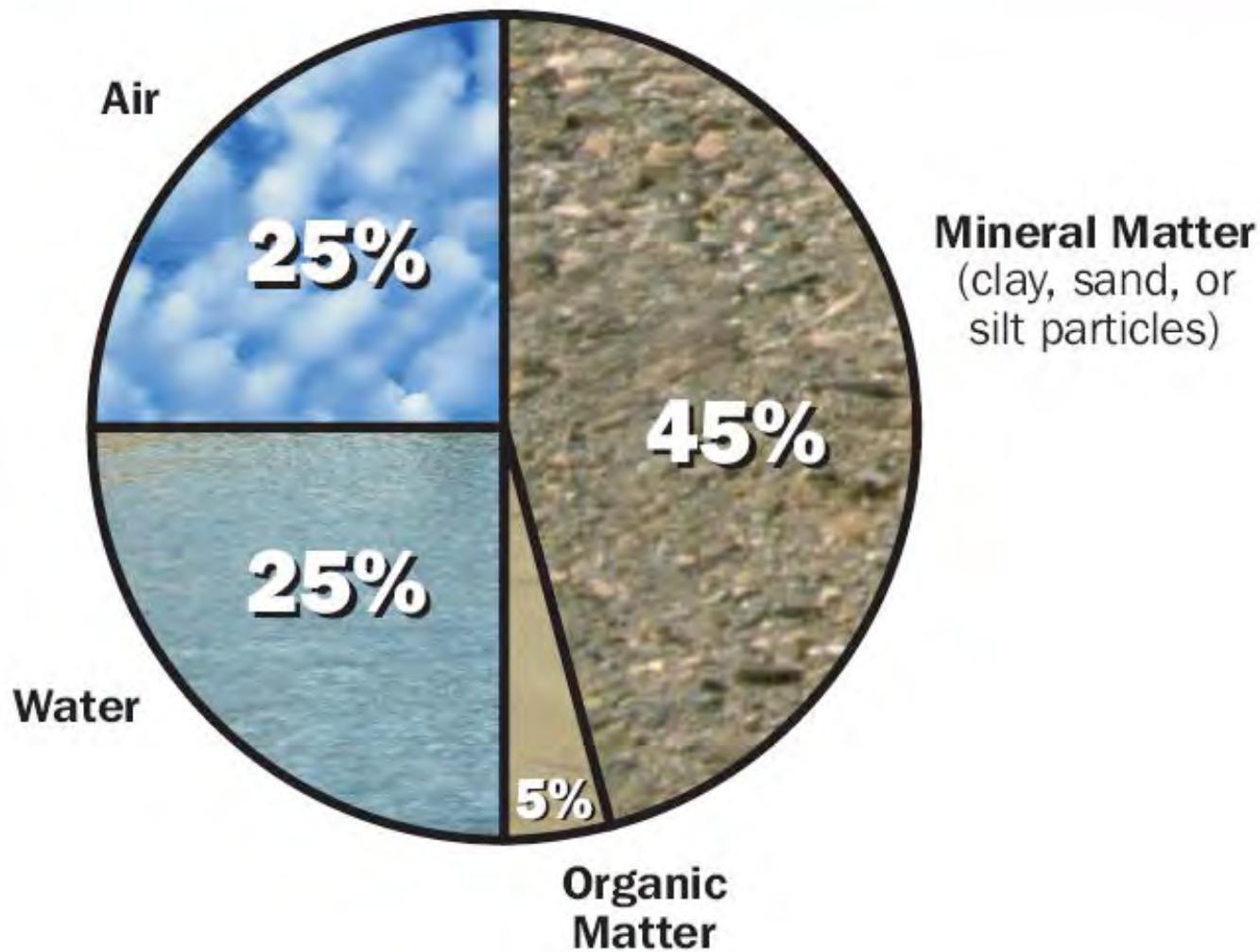
B. *Pore space* (50 percent of soil volume) represents the space occupied by air and water. There is a constant fluctuation in the amount of air and water found in the soil.



A schematic relationship between solids, liquids and air in the soil.

1. Air, which accounts for about 25% of the soil, is part of the pore space in the soil. 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.
2. Water, which accounts for about 25 percent of the soil, is also part of the pore space in the soil. When it rains, water will enter the soil or flow off the soil's surface.

COMPOSITION OF AVERAGE SOIL



III. Abundant life can be found in soil.

A. Forms of life in soil include:

1. Earthworms
2. Insects
3. Bacteria
4. Fungi
5. Other organisms





- B. Bacteria and fungi have an important role in the soil.
- C. Earthworms, ants, crawfish, moles, and other organisms improve the soil *tilth*, the ease with which soil can be worked. These organisms create openings in the soil as they tunnel. This enhances drainage and improves air exchange.

IV. Plants depend on soil to provide four basic needs.

- A. Anchorage—Soil acts to provide a firm support as roots grow throughout the soil.
- B. Water—Soil provides nearly all the water used by plants. Water is absorbed through the plants' roots.

C. Oxygen—Nearly all living organisms need oxygen. Plants release oxygen during photosynthesis but consume oxygen during respiration. Plant parts above the ground have an ample supply of oxygen. However, roots growing below the ground have less available oxygen. The exchange of gases between the soil and atmosphere is *soil aeration*. This is important for the health of plant roots.

D. Nutrients—Of the 16 nutrients considered essential for plant growth, 13 are obtained from the soil. Root hairs absorb the nutrients dissolved in soil water.



V. Not all fruit and nut trees require the same conditions for growth. For example, Blueberries might not grow well on soil that supports citrus trees.

Apples

- ▶ Require plenty of humus to hold moisture
- ▶ Successful orchard soils may range from sand to clay types.
- ▶ Avoid droughty soils and eroded soils with no distinct horizons between topsoil and subsoil.



Pears

- ▶ Slightly acidic soils preferred
- ▶ more likely to withstand poor drainage, but are less able to tolerate dryness.
- ▶ The ideal soil is a deep; rich loam somewhere between light and heavy.



Pomegranates

- ▶ The pomegranate does best in well-drained ordinary soil
- ▶ also thrives on calcareous or acidic loam as well as rock strewn gravel.



Peaches

- ▶ Will grow well in a wide range of soil types
- ▶ Deep soil ranging in texture from a sandy loam to a sandy clay loam is preferred
- ▶ Peach trees are extremely sensitive to poorly drained soils



Cherries

- ▶ Moist but well drained soil needed
- ▶ Intolerant of compacted soil



Plums

- ▶ Prefer a slightly acidic soil
- ▶ Depending upon variety, plums can be grown on heavy soils or slightly loamy soils



Apricots

- ▶ Prefer pH of 6.0-7.0
- ▶ Need well-drained loam soils with a minimum depth of about 1.5 meters



Mulberries

- ▶ prefer warm, well-drained, almost loamy soil.
- ▶ somewhat drought resistant, but fruit will drop during dry weather



Almonds and other Nut Trees

- ▶ Different nut trees require different soils and grow best in elevated, well-drained areas.
- ▶ Most require light soils because they have very deep taproots that need to reach an adequate source of water.



B. Small Fruits

1. Grapes

- a. Soil conditions favorable to root growth include good aeration, loose texture, moderate fertility, and good internal and surface drainage.
- b. Proper soil drainage is very important
- c. Compacted soils prevent root growth and contribute to yield loss and limited vine survival.

2. Bramble fruits

- a. Soil drainage is very important, however moist soil is required
- b. Sandy loams and loams are desirable, heavy soils are not.
- c. A good supply of organic matter and deep well-drained subsoil are important.

Review/Summary

1. How do the resources soil provides help in supporting life?
2. What are the components of soil?
3. What is the biological nature of soil?
4. What are the four ways plants use soil?
5. Describe the soil requirements for various fruit and nut crops.