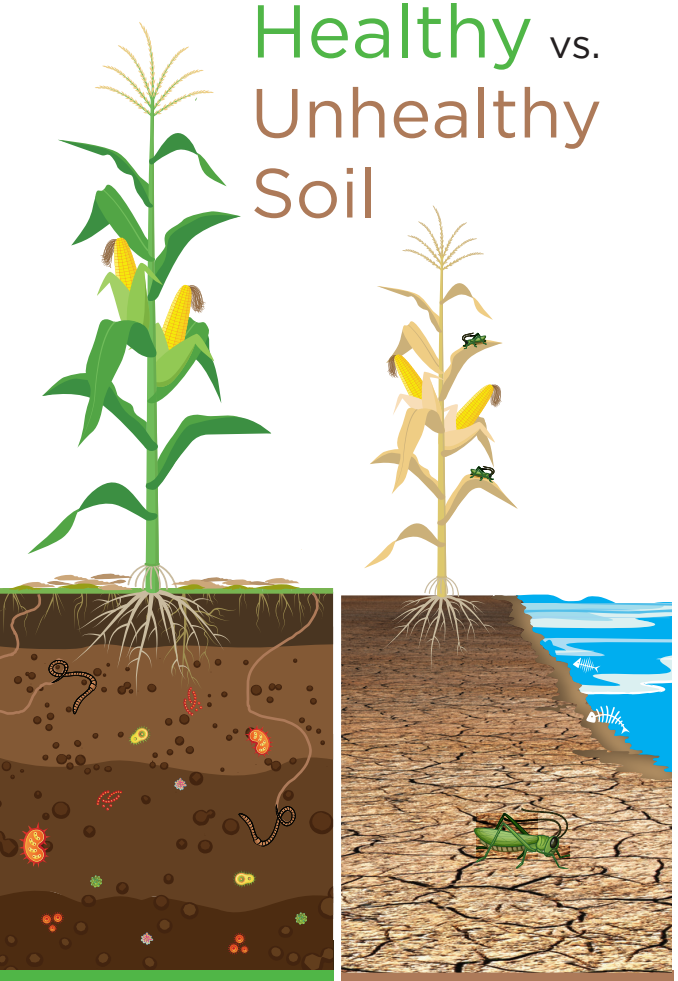
Healthy vs. Unhealthy Soil



Earthworms
add important nutrients as well as create vital water channels which allow rain to soak through.

Microorganisms
such as bacteria and fungi help to filter contaminates and stabilize the soil to prevent erosion.

Residue
or stubble grown from previous crops acts like mulch helping soil to retain moisture and preventing erosion.

Bare Soil
unprotected from elements, will crack, turn hard and become dusty, making it difficult for water to reach roots.

Erosion
is more likely to occur from unhealthy, unprotected soil. When soil from fields runs off into nearby streams it can harm fish and other wildlife.

Dangerous Chemicals
like pesticides and fertilizers can cause serious health and environmental issues if they contaminate water.

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In recent years, global attention has been drawn to the importance of a healthy soil. One of the key facts emphasized by the Food and Agricultural Organization was that sustainable management of soils can lead to a **58% increase in food production** (FAO, 2015). Soil nutrient composition plays a key role in determining the health of a soil.

Healthy soil must have all the essential elements in the right proportions to support healthy plant growth throughout its life cycle. It must have strong and diverse microbial activity. Good management builds, supports and maintains this diverse population of soil microorganisms.

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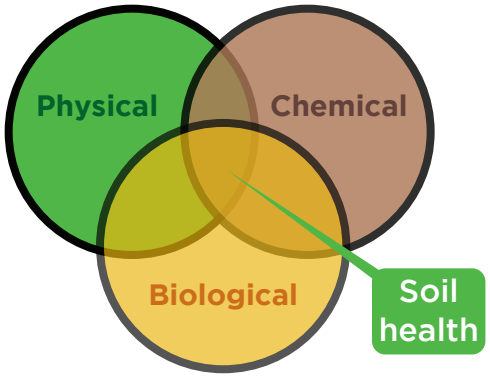
HEALTHY SOIL

What makes a good soil?

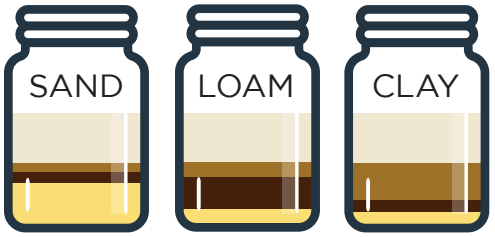


Physical

There are three main particles sizes in the physical part to soil; sand, silt, and clay. In most cases, a sandy loam is the best.

Test your soil: Use a clean, empty jar with a tight lid.

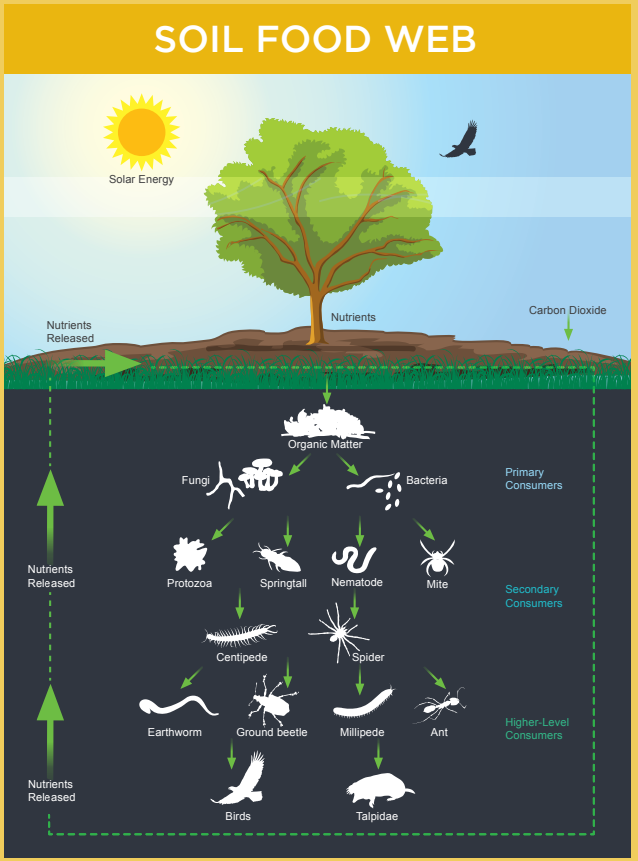
1. Fill the jar about half full of garden soil.
2. Fill the jar nearly to the top with water.
3. Tighten the lid and shake the jar for several minutes so that all the particles are in suspension



0-10% clay
0-10% silt
80-100% sand

10-30% clay
30-50% silt
25-50% sand

50-100% clay
0-45% silt
0-45% sand



Biological

One teaspoon of healthy soil contains 100,000,000,000 individual bacteria.

Soil organisms play critical roles in plant health and water dynamics. Processes that soil organisms contribute to include: nutrient cycling, nutrient retention, water infiltration and water-holding capacity, disease suppression, degradation of pollutants, increasing the soil's biological diversity, and improving soil structure.

Soil biological processes are responsible for supplying approximately 75 percent of the plant-available nitrogen and 65 percent of the available phosphorus in the soil. Like all organisms, those inhabiting soil need food and a favorable environment. Adequate organic matter content, ample aeration, moderate moisture, neutral pH and warm temperatures all favor increased microbial activity.

Chemical

There are two ways to get elements into soil — biological and synthetic:

- **Biological**
  The soil has available and non-available elements. The biology releases those elements to the plant.
- **Synthetic**
  Chemical fertilizers supplement the elements that are necessary for higher production.

Soil microbiology is the study of organisms in soil, their functions and how they affect soil properties. Soil microorganisms can be classified as bacteria, actinomycetes, fungi, algae, protozoa and viruses. Importantly, these organisms do not exist in isolation; they interact and these interactions influence soil fertility as much or more than the organism's individual activities.