



Healthy soil is the basis of healthy plants and a healthy environment. When garden soil is in good shape there is less need for fertilizers or pesticides. As author and respected gardener Frank Tozer writes, “When building soil you not only improve your plants health, but you can also improve your own.”

Organic soil is rich in humus, the end result of decaying materials such as leaves, grass clippings and compost. It holds moisture, but drains well. Good [organic garden soil](#) is loose and fluffy — filled with air that plant roots need — and it has plenty of minerals essential for vigorous plant growth. It is alive with living organisms — from earthworms to fungi and bacteria — that help maintain the quality of the soil. Proper pH is also an essential characteristic of healthy soil.

So, how do you know if your [soil is healthy](#)? And what do you do if it isn't?

## Determining Soil Health

Of the 17 or so elements thought to be essential for plant growth, nitrogen, phosphorus and potassium are the most important (see [What's in a Number?](#)). They are known as primary or macronutrients because plants take them from the soil in the largest amounts. Fertilizers that contain all three of these nutrients are labeled complete fertilizers, but they are hardly complete in an absolute sense. Calcium, magnesium and sulfur, known as secondary nutrients, are also important to many plants. Lesser or micronutrients include boron, copper, iron manganese and zinc. Some [plant micronutrients](#) have specific functions such as cobalt, which isn't used by most plants but helps legumes fix nitrogen. Another critical component of your soil is its acid-alkaline balance or pH reading. All these essentials — and the proper texture — makes for healthy soil.

## Testing

One way to determine what minerals are lacking or abundant in your soil is to get it tested. Local [Cooperative Extension Services](#) often offer low cost soil tests. These tests usually measure levels of soil pH, magnesium, phosphorus, calcium, potassium, and sometimes nitrogen. They may also report the soil's micronutrient content, but this isn't essential to the gardener who adds plenty of organic matter to her soil. For a less intensive test, pick up a do-it-yourself version such as the **Rapitest Soil Test Kit** and do your own simple, rewarding chemistry.

pH levels can be critical to your plant's ability to absorb nutrients. Most minerals and nutrients are best available to plants in soils with a pH of between 6.5-6.8. If your soil is acidic (low pH, at or below 6.0) or

alkaline (high pH, above 7.0) it doesn't matter how rich it is in nutrients, the plants won't be able to absorb them. pH is usually included in a soil test, or you can buy a [pH Meter](#) and determine the acid-alkaline balance of your soil on your own.

The best time to get the soil tested is in the spring or fall when it is most stable. This is also the best time to add any [soil amendments](#) or [organic fertilizer](#) should your soil fall short of minerals or nutrients.

## Soil Texture and Type

In addition to uncovering your soil's pH, macronutrient content and mineral levels you'll want to examine its texture.



[Organic Gardening](#)  
 › [Soils](#) ›  
[Amendments](#)

Soil texture depends on the amounts of sand, silt and clay it holds. A handy description of the three main soil components and an easy test to determine your soil type can be found

at [NASA's Soil Science Education Page](#). Sand constitutes the biggest pieces of soil particles and feels gritty to the touch. Next in size are the silt particles which are slippery when wet and powdery when dry. The smallest pieces are clay. They are flat and tend to stack together like plates or sheets of paper. You don't need an expert to determine soil texture. Just pick up a little and rub it between your fingers. If the soil feels gritty, it is considered sandy. If the soil feels smooth like talcum powder, it is silty. If the soil feels harsh when dry and slippery and sticky when wet, the soil is heavy clay. Most soils will fall somewhere in between.

Sandy soils tend to be nutrient-poor since water and nutrients rapidly drain through the large spaces between the particles of sand. These soils also tend to be low in beneficial microbes and organic matter that plants thrive on.

Silty soils are dense and do not drain well. They are more fertile than either sandy or clay soils.

Heavy clay soils are quite dense, do not drain well and tend to be hard and crack when dry. Because there isn't much space between the clay particles, there usually isn't much organic matter or microbial life in the soil. Plant roots have a hard time growing in the hard material.

## Improving Garden Soil

Adding organic matter in the form of compost and aged manure, or using mulch or growing cover crops (green manures), is the best way to prepare soil for planting. Adding chemical fertilizers will replenish only certain nutrients and do nothing for maintaining good, friable soil. Organic matter will help supply everything your plants need.

## Air

Just like humans, plants need air, both above ground for photosynthesis and in the soil as well. Air in the soil

[Organic Gardening](#)  
 › [Soils](#) › [Testing](#)  
[Equipment](#)

