

Soil: My Garden's Foundation For Success

LESSON TWO

What's Ahead

In Lesson 2, you'll learn:

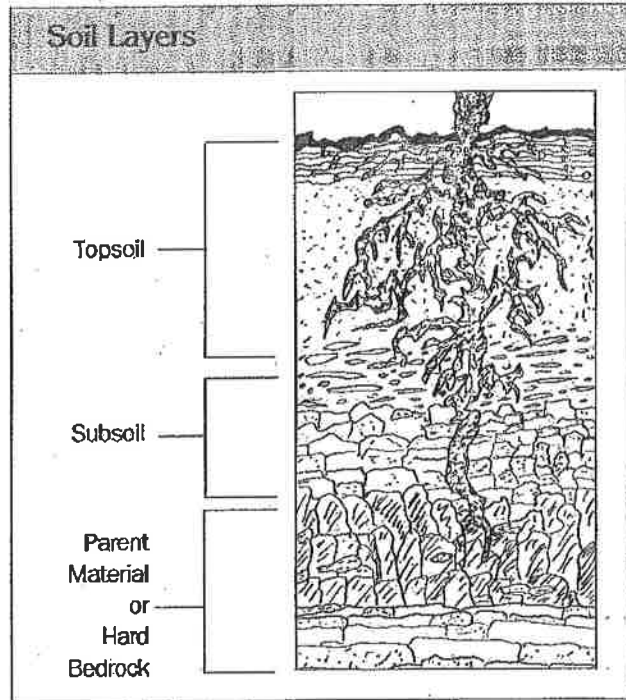
- what's in soil;
- the physical and chemical properties of soil;
- why organic matter is important;
- the benefits of lime;
- the need for soil tests; and
- ideas for improving your soil.

Have you ever passed an excavation site and noticed the different layers of soil piled up as the workers dig deeper and deeper into the earth? If we could see a cut-a-way side view or "profile" of the earth, we would see many soil layers.

The layers include the topsoil; a subsoil; and the "parent material" or bedrock. The top layer (topsoil) is generally dark in color because it contains organic matter. This layer ranges from four to six inches, depending on the soil type. The next layer (subsoil) is usually lighter in color. The parent material (bedrock) may be loose material or solid rock.

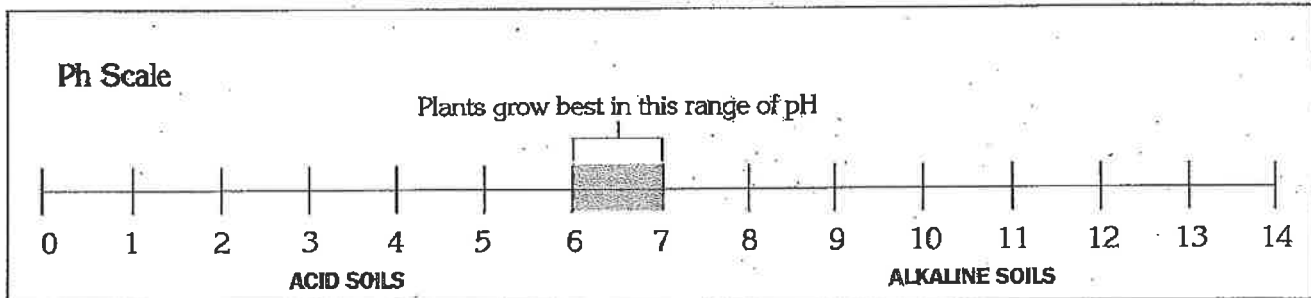
Soil just didn't happen. It took ages for minerals and organic matter to become soil by freezing, thawing, flooding and drying. It can take 1,000 years for an inch of topsoil to form. As a gardener, you have a great opportunity to conserve this valuable resource, and even

improve it. The efforts you make to improve your garden soil will give quick returns. You will be able to see and taste the fruits of your labor.



What's in Soil?

Soil has four major components: parent material (minerals), organic matter, air and water. Each is important for the growth of plants. Soil is made up mostly of parent material. Parent material is the solid part of the soil, ranging in size from



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KEY POINT 1:

Soil is made up of solid minerals, air, water and organic matter.

KEY POINT 2:

The soil pH, or relative acidity, is a chemical property of soil.

solid rock to sand, silt and clay. It is the source of many nutrients that plants need to grow. About five percent of the soil is made of organic matter. Organic matter is material that was once alive and is in the process of breaking down or is fully decomposed. Organic matter begins as live plants or animals.

About one half of the soil is solid. The other half is called "pore space." The pore space in soil is filled by air or water. The ideal amount of air and water in the soil is about 25 percent each, but these percentages change with the weather and other factors. Too much air or water can stunt plant growth. Plant roots need a balance of both air and water to nourish the plant.

Soil Texture: A Physical Property

There are many different kinds of soil. They vary from region to region, across the country and around the world. Many soil properties can be distinguished by sight or touch. These are called physical properties. Texture is one of the physical properties of soil.

Soil texture refers to the mix of different particle sizes in your soil. Particle sizes range from coarse to fine. Each category has been given a name. The coarsest soil particles are called sand. The finest soil particles are called clay, which are so small they can only be seen with a powerful electron microscope. The in-between

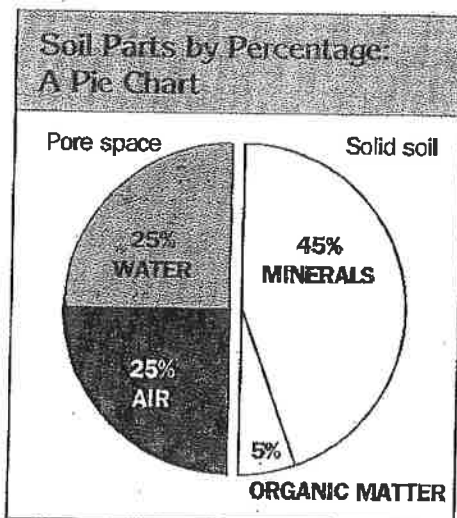
particles are called silt. By themselves, none of these particle sizes would be good for your garden. A mixture of sand, silt and clay is needed, along with organic matter, for good garden soil.

Soil pH: A Chemical Property

Chemical properties of soil cannot be seen or felt. But these properties are just as important for plant growth and soil productivity as the physical properties. The soil pH (pronounced "P" "H"), or relative acidity, is a chemical property of soil. Soils that are too acid (sour) or too alkaline (sweet) prevent good plant growth. Your plants need a "happy medium."

The pH scale ranges from 0 to 14 (see illustration on page 9). The best pH for most garden vegetables ranges from 6.0 to 7.0. Test your soil to determine soil pH. Soil testing is the only accurate way to measure soil pH. The pH test can be done by a soil lab, with a store-bought meter, litmus paper or dyes.

Soil nutrients are also part of the soil's chemical properties. The availability of these nutrients to the plant depends on soil pH. If you keep soil pH in the right range, add organic matter yearly and apply nutrients when needed. The soil will be fertile and productive.

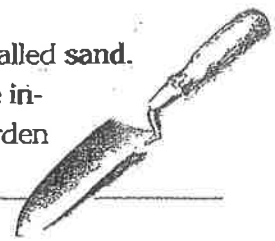


▶ **KEY POINT 3:**

Organic matter improves plant growth, helps the soil hold moisture and buffers soil pH.

▶ **KEY POINT 4:**

The coarsest soil particles are called sand. The finest are called clay. Those in-between are called silt. Your garden needs a mix of all three.



Improving Your Garden Soil

You can improve your garden soil by both taking action and not taking action.

Actions to Improve Your Soil:

- Add organic matter.
- Plant a cover crop. This will prevent erosion.
- Add lime to increase soil pH when needed. This will improve a soil that is too acidic.
- Add nutrients to boost plant growth.

Non-Actions to Improve Your Soil:

- Keep off the soil to prevent soil compaction.
- Minimize rototilling to maintain soil structure.
- Don't till the soil when it is wet.
- Let the soil lie fallow once every several years.

Why Organic Matter Matters

Organic matter improves plant growth. It helps the soil hold moisture and nutrients, and buffers the soil pH. Organic matter gets used up as plants grow, and as you till the soil and harvest your crop. Weather also causes organic matter to get used up. You need to replenish the organic matter each year so that future crops will grow successfully. Here are examples of organic matter you can add to your garden soil:

- compost;
- aged manure; and
- green manure crops.

Add Lime for Better Returns

If you add lime to your garden soil, you'll raise the soil pH and make more nutrients available to plants. You can add lime any time of year. However, for best results, till the lime into the

soil. If you lay lime on the soil surface, you'll be in for a wait. It could take years for it to do some good. The goal is to get the lime in the plants' root zone. Even so, it may take several weeks or months for you to see a difference.

There are many different types of lime. Agricultural lime is often used by gardeners and farmers. Dolomitic lime is a type of agricultural lime with magnesium added. You can use wood ash to raise soil pH. Small amounts can have a great effect. A soil test will tell you how much lime your garden needs, as well as the type of lime needed.

Soil Testing: Your Best Crop Insurance

Test your garden soil every third year. The soil test or analysis will show the nutrient levels and soil pH.

The best time to test garden soil is in the fall, after harvest. This allows you time to apply lime or organic matter before the snow flies. Both should be tilled in. By spring, the lime has begun to raise the soil pH and will benefit the plants during the growing season. Lime stays active in the soil for two years or more.

Contact your county Extension office for a soil test kit. You can purchase a home test kit from garden supply stores, but laboratory testing is much more accurate and will provide recommendations.

Lesson 2

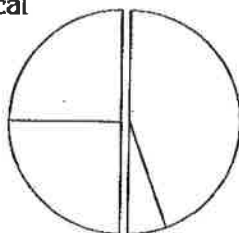
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Summary

In this lesson, you've learned about soil — what it's made of and how to improve it. Now try to answer the **Study Questions**. They will help you remember what you've learned. The **Study Activities** will help you apply your new knowledge. In the next lesson, Lesson 3, we'll learn how to plan and design a vegetable garden.

Study Questions

1. Show soil parts in the chart below. Label each soil component and its typical percentage.
2. List three ways you could improve soil.
3. What is soil pH? How is it measured? Using the scale below, label neutral, acid and alkaline pH levels.



0

14

4. Why is organic matter so important to soils and plants?
5. When can you add lime to the soil?
6. List the names of the three soil texture types. (See answers on the bottom of this page.)

Other Resources

Check with your county Extension office for these publications:

- Bulletin #7101, Best Management Practices for the Home, Part 2: Home Gardening
- Bulletin #2091, Liming Potatoes
- Bulletin #5045, Soil Insects of Vegetables

Study Activities

Soil Sampling

Take a soil sample and have it analyzed by the Maine Soil Testing Lab. Get a soil test kit from your county Extension office.

Soil Collection

Collect samples of different soils. Notice the differences in color, texture and moisture. Observe plant growth from different soil types.

Layer ID

Take a photo of a soil profile at an excavation project near you, or draw a picture showing the various soil layers.

Study Question Answers

1. Check your answers with the pie chart on page 10.
2. Add organic matter; plant a cover crop; add lime; add nutrients; keep off the soil; minimize rototilling; don't till the soil when it's wet; let the soil rest every two to three years.
3. Soil pH tells how acid or alkaline the soil is. It is a chemical property of the soil and is measured with a soil test. See page 9 for pH range line.
4. Organic matter improves plant growth, helps the soil hold moisture and buffers soil pH.
5. You can lime anytime, but it should be worked into the soil. After the fall harvest is a good time to add lime. (Lime spread on frozen ground could be lost to wind or rain.)
6. Sand, clay and silt.