The Story of Soil

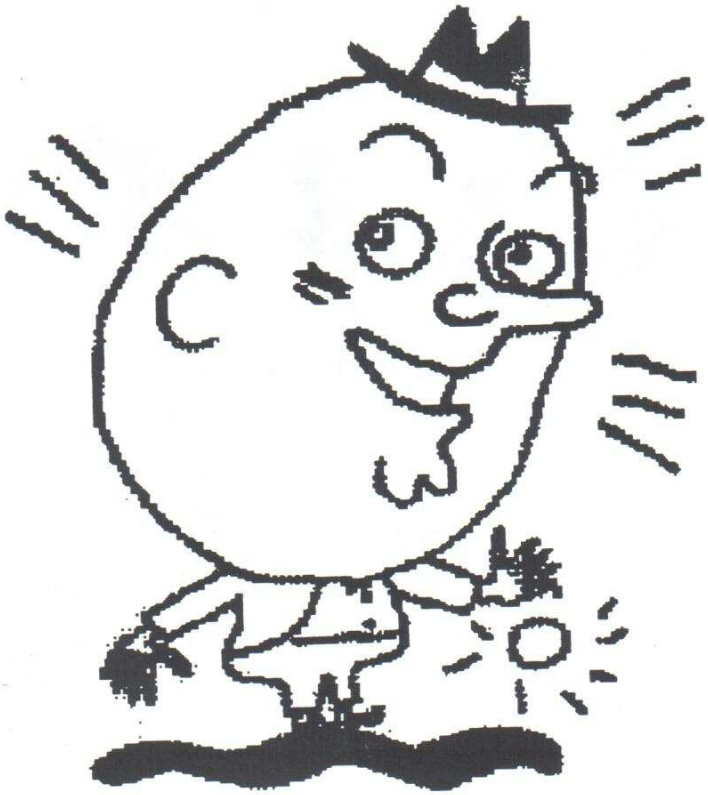
USDA

Natural Resources Conservation Service

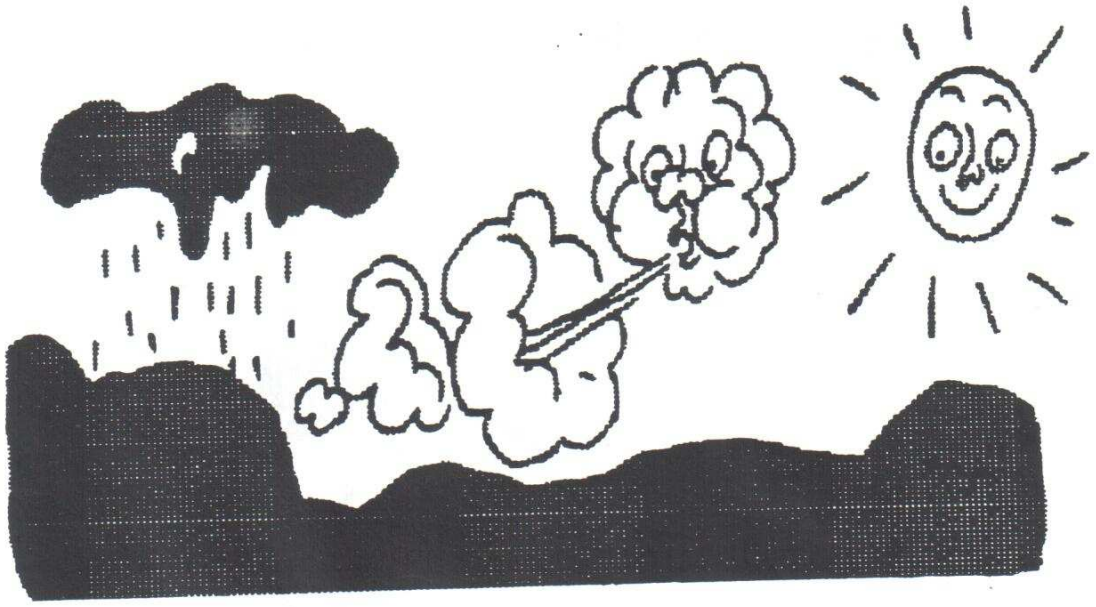
Maryland State Office July 1997

What do you plant seeds in, soil or dirt? If you're wise, you'll answer soil, because you shouldn't expect anything to grow in dirt. Soil is a factory that helps produce man's food. Dirt means waste material that has no use.

Yes, soil is a living, working factory, almost as alive as an animal. Seeds are put into the factory and the soil feeds them, nourishes them, helps them grow into plants that may be useful to man.



How does soil do this? What is there in the soil that feeds and supports plants? Well, first of all, we should remember that soil is alive and changing. It lives and breathes and works just as we do. Wind, rain, and sun made the soil by chipping and wearing away big rocks until the pieces were so small that they could hardly be seen. This goes on all the time, so that new soil made as the old is worn or blown away.



If you want to see how this is possible, pick-up several rocks and try to squeeze them. Perhaps you'll find that you have chosen a old one that has been worn down by the weather. See how it is cracking and breaking apart? The constant heating of the sun and cooling of the wind and washing by the rain have weakened the framework of the rock. Imagine this taking place all over th world for ages and ages and you can see how the soil was forme

Mixed in with these pieces of rock are other minerals, little bits of plants that have died, and even small, unseen creatures that live in the soil.

What are these creatures? They are bacteria, fungi, molds, and protozoa, "little plants," and animals that can be seen individually only with the aid of a powerful microscope. We cannot see these tiny creatures with our own eyes but we know that they can help the growth of a plant or kill it.

Dead plants or animal wastes that fall to the earth are taken in by the soil, where they decay through the action of these creatures. After they have been digested, they renew the soil's vegetable and mineral store. In this way the soil makes use of plant and animal wastes and changes them into things that can be used again. The factory works very well, doesn't it? Nothing is wasted, and the same materials are used again and again. Besides the pieces of rock, minerals, and products made from these wastes, the soil holds water and gas which help it do its work.

If you dig a hole, you will see that the soil farther down in the earth is a different color than the soil on top. The soil on top is called "topsoil." This top layer may be a few inches or a few feet deep. Beneath it is the subsoil.

Pick up a handful and look at it closely. It is usually lighter in color than the topsoil because it contains less decayed plant growth. Notice that it is usually finer because the smaller particles from the topsoil were carried downward.

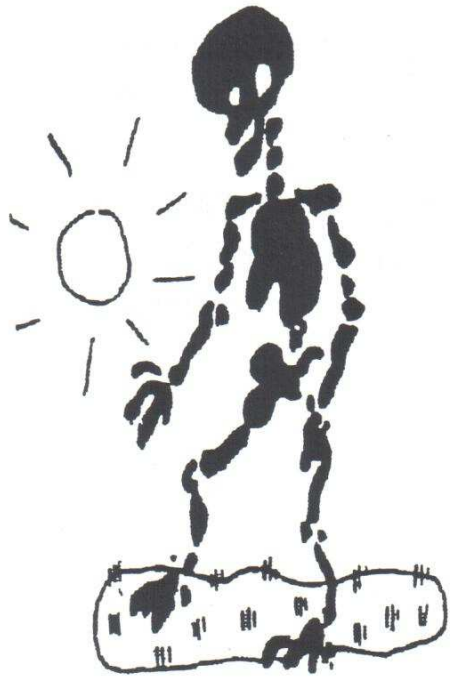
Heat, water, and wind haven't had as much chance to change the subsoil as they have the topsoil that is exposed. It is usually less productive than topsoil, because plants' root have gone down into it and taken out food. Nature and man have added plant and animal material to the topsoil, which makes it different from the subsoil. The difference in color often makes it easy to see where one stops and the other begins. Just as there are different kinds of men in the world, there are different kinds of soil. Sand, sandy loam, silt loam, and clay loam are the most common soils.

Soils vary in color from almost pure whit to black, cream color to purplish red. Soils rich in decayed plant material are black, and coloring substances such as iron may make a soil yellow or red. Soils, however, do not always stay the same color, as they produce crops they may become lighter as they lose decaying plant material. This material is called "organic matter." Small creatures make their homes in decaying organic matter and use it as food. Unless farmers add organic matter to the soil by plowing under plant material, or it is added naturally by plants dying, organic matter in the soil slowly disappears. Care is necessary to keep the soil supplied with organic matter. Hay crops when take away from the field leave little to be plowed under and other crops when harvested or pastured remove plant material.

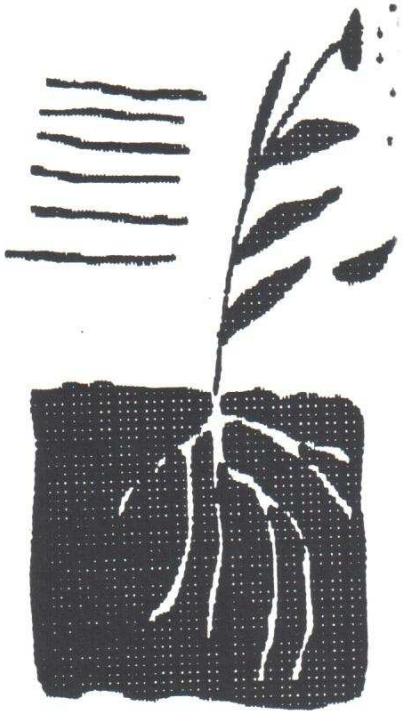
Organic matter is important. It helps keep the soil from washing away acts as a sponge to absorb water so that plants will suffer less during dry weather. It supplies the soil with material that may later become food, and helps hold this plant food.

Soil, like man, has a skeleton or frame work of "bones" to hold it together. But the "bones" of the soil are small pieces of rock. They give the soil backbone, and activities go on between the walls of this skeleton. The bones of this frame work vary from one soil to another as they do from animal to animal. Some are made of coarse gravel. Others are fine-grained clay.

When you look at some of our fine-textured soils, such as clay, you wouldn't think there would be any spaces between the soil particles, but there are. This is important, as an ideal soil for plant growth mus have both air and water in these tiny spaces. The water is important because plants can get the plant food supplied by the soil only with th help of water. The water between the particles and the little film around each particle contain the dissolved plant food.



Yes, air is also important in our soil. Without it the millions of helpful bacterial couldn't live there. The bacteria are there to decay the material that is plowed into the soil. Too much water in the soil shuts out the entrance of air. Then what happens? If some of the bacteria do not get enough air from the soil, they cannot live, and a harmful kind of bacteria thrives and removes oxygen from the chemical compounds in the soil. This creates a very unfavorable condition for the roots of the plants. You can see why it is necessary to drain soils or why plants do not do well during long periods of wet weather and don't think that soil doesn't move around, just because it doesn't have legs! Water flows through it and carries along food which the soil has made, as well as waste that the soil wants to get rid of. Did you ever hear anyone say that the soil is sour or sweet? What did they mean? Soil is sour when it is acid and sweet when it is neutral or slightly alkaline.



Most of the soils east of the Mississippi River are sour while those west are usually sweet or alkaline. Many plants will not grow in sour soils, and to make them sweet, ground limestone is usually applied, but like man, soil has its limitation. We cannot expect it to continue to work for us if we give it nothing in return. Soil must have food to keep it going and to help it perform the functions which are so important to us. it must have some nourishment to feed plants, and it should have enough left over to leave stores of minerals that are required by plants.

Soil has two big jobs. It protects the plant, feeds it, holds it in place, and builds it up. In addition to helping the plants in this way, the soil changes waste materials from plants and animals into plant foods that can be used again.