

IV. How Fast Do Soils Take in Water?

You will need 6 large fruit or vegetable-juice tin cans; board 4 inches wide, 1 inch thick, and 12 inches long; hammer; 12-inch ruler; pocket watch with a second hand; pencils and paper; quart measure; and 2 gallons of water. It may take 2 to 3 hours to complete this activity.

Cut the bottom out of one end of the can just below the rim. This leaves a sharp edge that will drive into the ground easily. Cut out the other end, leaving the rim on for added strength.

Avoiding sandy soil, find a spot in each of the following places:

1. An ungrazed and unburned woodland where there are dead leaves on the ground, $\frac{1}{2}$ to 1 inch or more deep.

2. A grazed woodland where livestock have packed the soil.

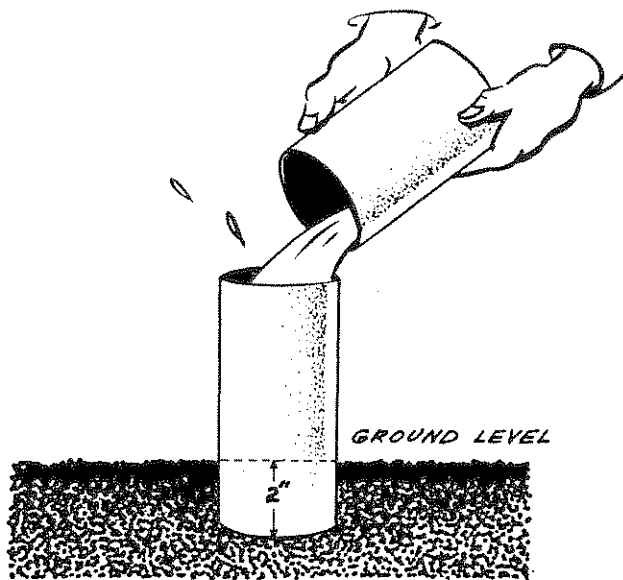
3. A fence row or park where the grass has never been plowed up.

4. A pasture that has been grazed heavily and the ground is packed.

5. A cultivated field where topsoil has all eroded away, leaving subsoil exposed.

Try to locate places close together so that as nearly as possible the same kind of soil is used.

Mark the outside of each can 2 inches from the end without the rim. In each of the spots you have selected, set a can so that the end closest to the 2-inch mark, is on the ground. Place a board on each can and tap with the hammer until the



2-inch mark is level with the ground. Do not disturb the plant material or soil in the can. Avoid spots where sticks or stones make it hard to drive the can down. Add 1 quart of water, and then complete the following record for each location:

1. Place. (Identify as ungrazed or unburned woodland, grazed woodland, fence row, heavily grazed pasture, eroded cultivated field.)
2. Condition of the soil.
3. Presence of leaves or sticks.
4. Time when quart of water was added.
5. Measure amount of water that has moved downward at the end of each minute for the first 10 minutes. Thereafter, note the drop every 10 minutes or every hour, depending on the rate of water movement. (Measure from the top of the can to the water level.)

Compare the rates of water intake. Do the study all in 1 day so that, at the beginning of the activity, the soils will have, as nearly as possible, the same amount of moisture.

Another way to check how fast soils take in water is to go out after a rain following a dry period. Take a spade and dig down to see where the water has soaked the deepest in the following spots: (1) On bare soil where clay is showing, (2) in woodland where there is a good covering of leaves, (3) in a good pasture where there is a heavy sod, (4) on a steep slope, and (5) in a sandy soil.

For teachers who cannot get out into the country, the following will be suitable: (1) An open lawn with good sod that is not walked on much; (2) an area beside the walk or a path that is

heavily trampled; (3) a spot within a well-developed clump or row of shrubbery (keep away from paths); (4) a garden or flowerbed.

INTERPRETATION

Rate of water intake determines the amount of water that runs off. The more water that enters the soil the less there is to run off.

But there are other advantages to soils that take in water readily. Much of the rain that falls during heavy rainfalls soaks into the soil and is available for plants later on. And during July and August when rainfall is often light, except for rather intense thundershowers, it is even more important that as much rain as possible soaks into the soil for plant growth.

We have all seen streams running red and brown with soil washed off fields after such summer storms. Soil and water conservationists have learned that the erosion-control measures they plan must be designed to handle violent storms. They have learned from research studies that most of the erosion that occurs during the year is caused by these storms.

Plants need air in the soil for best root development and growth as do many kinds of bacteria. Water movement in the soil brings better air circulation. When water enters the soil, air moves out and is replaced by fresher air as soon as the soil pores are again free of water.

The way soil has been managed has a lot to do with how fast it takes in water. Hard farming—using land year after year for cultivated crops with little or no grasses and legumes—uses up the organic matter and causes the soil to become hard and dense. A crust, a fraction of an inch to an inch or more thick, may form over the surface. Laboratory studies at the University of Illinois showed that water moved through a crust only one-third to one-fifth as fast as it did through the soil just below the crust. Other studies showed that water moves through the soil below the plow layer 10 to 30 times faster than through the plow layer itself. This proves the importance of good management in preventing erosion. Farmers who grow grasses and legumes in crop rotations help their soil to take in more water and thus prevent much erosion.

Growing trees, shrubs, and mixtures of grasses and legumes for permanent cover also add organic matter to the soil and prevent the formation of a dense layer or crust.

Gardeners can improve the water intake and retention rate of their soils by adding plenty of compost every year. Since a "crop rotation" is not practical in urban gardens, it is especially important to apply plenty of organic matter each year.