

but in addition keep one flower pot submerged in a pan of water. Compare the growth of the two plants for a month. In case someone objects on the ground that too much water rather than too little air was the cause of poor growth, try growing one plant in a tomato can, which is not porous, and the other in a porous flower pot.

If we discover that roots need air, what is a strong argument in favor of drainage? If roots need air in a small pot or can, would they also need it in a field or garden? What is the connection between experiments 2 and 3?

Briefly, then, every farm operation can be tried in the school-room, but our acquired knowledge should always be applied to the real operations of life.

EXPERIMENT 4.

Will water rise through soil?

Tie a piece of cheese cloth over the bottom of each of two lamp chimneys, and fill each chimney with soil. In one case press it firmly. In the other, leave it loose. Suspend each chimney so that about an inch of its base dips into a jar of water. Does the water rise through the soil? If so, does it rise with equal rapidity? Let this experiment go on for several days. What change takes place in the level of the water in the jar? After the soil in either lamp chimney becomes moist to the top, does the water still continue to lower in the jar? Why? Try a third chimney with compact soil in its lower half and loose soil on top. To what height does the soil become wet?

The water in the jar corresponds to the natural water in the soil, which accumulates from the rain of all seasons and melting snow of spring. What does experiment 4 teach about the reason for cultivation? It teaches the same as experiment 1; but also shows us the source of water that good cultivation may save.

EXPERIMENT 5.

Does the composition of soil influence its power of absorbing and retaining moisture? Fill one tomato can with fine sand, another with clay, a third with loam (sand and clay in equal parts) and a few others with any one of these soils and a varying amount of humus (black swamp mud, or rotted manure, or leaf-mould). To begin, spread each soil in the sun for a day or two to dry. Then weigh a can of each in its dried condition. Next, add water until each soil is soaked. In this

condition, any additional water would run off. Find the percentage increase of weight in each case. This will show the varying powers of soils to absorb water. By weighing these cans daily, find out which dry out more rapidly. Does this experiment show one use humus would have in garden or farm soil?

As soon as danger of freezing at nights is over, pupils should try growing plants in pots of the foregoing soils under the various conditions outlined, and under any other conditions they think of. Thus they learn, first hand, not only how the soil responds to various treatments; but how plants respond to different conditions of soil.

When garden work begins in the spring, refer back continually to the winter experiments, and ask the children what treatment their garden should have, and why. Be sure that they know what kind of soil they are dealing with. Some will tell you it is rocky soil. Let the children learn to recognize soils by their texture; by their "stickiness" when wet; by their color in the case of humus. Some soils are strongly alkaline or acid. Test with litmus paper, and use your knowledge of chemistry in prescribing a remedy. Find whether humus soils are usually acid or alkaline? Try the same with sandy soil. Notice the relationship between acidity of a soil and the kind of plants it grows. For example, try the soil from a mossy spot in a hayfield. Try also, soil that grows sorrel, or blueberries, or lambkill.

Lessons on the origin of the soil are interesting for advanced grades. But since our business is to get all we can out of the soil already in existence rather than to make more soil, let us learn, first, all we can about the treatment required for any desired results. Its physical condition and its chemical composition are largely under our control. Let us learn to control them wisely.

BEFORE CHRISTMAS CAME.

Say, 'fore Christmas came, what you s'pose they did?
 Didn't they have presents then in their stockings hid?
 Didn't they have dolls and drums? Didn't they have toys
 For their little girls then and 'specially for boys?
 Didn't they go to Grandma's? Didn't they have a tree?
 Didn't they hang their stockings up? Where could Santa be?
 Didn't they have Christmas songs? Did school keep just
 the same?

Well! if all that is true, I'm glad that Christmas came.

—Selected.