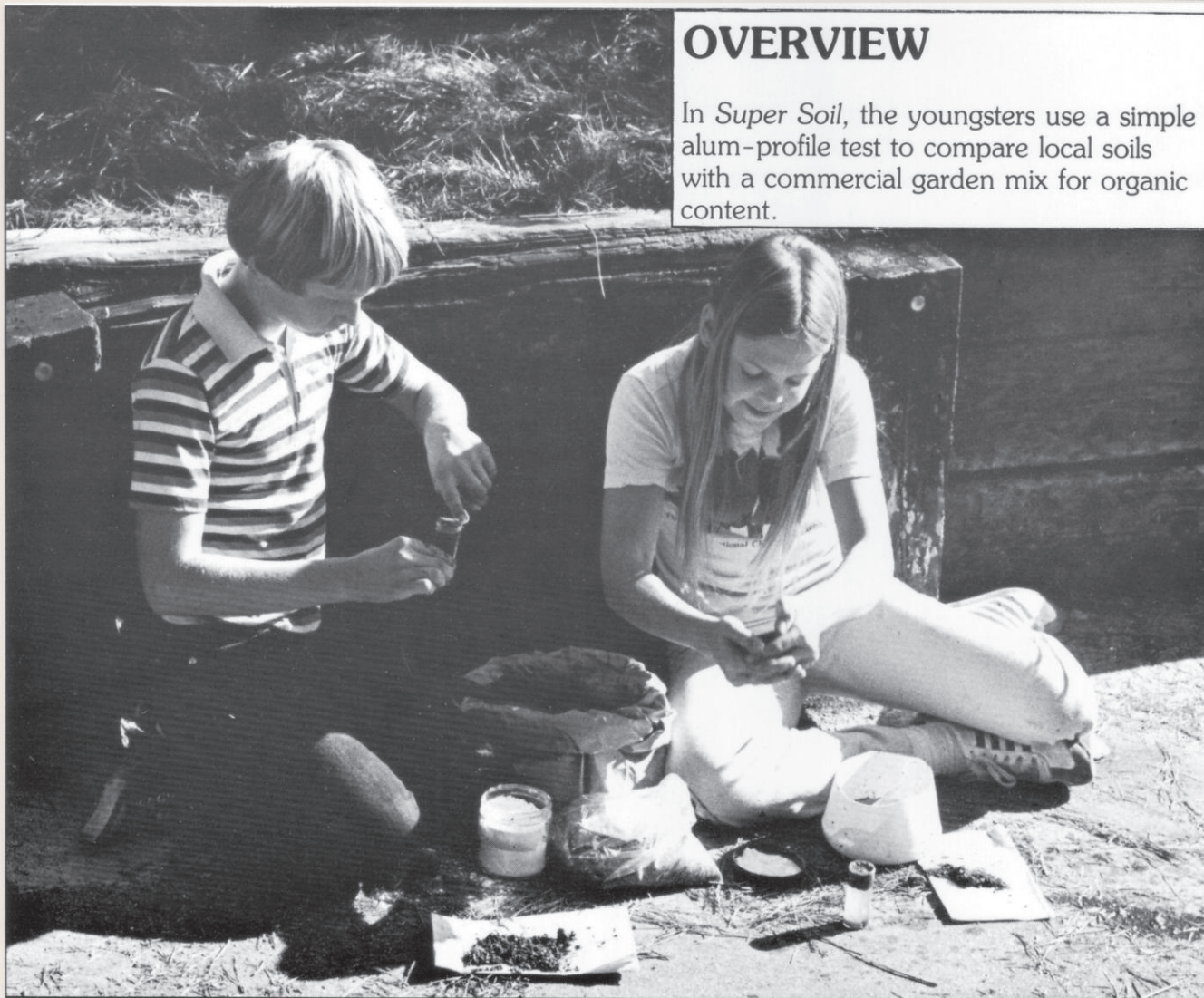


OVERVIEW

In *Super Soil*, the youngsters use a simple alum-profile test to compare local soils with a commercial garden mix for organic content.



BACKGROUND



Soil is more than just “dirt.” Soil is a mixture of water, air, minerals, organic matter, and living organisms. In proper balance, these ingredients form a healthy soil that fosters plant growth.

Organic matter consists of plant and animal material that bacteria are breaking into small parts. This process is called *decomposition* or *decay*. Organic material is most often found in the top few centimeters of soil. Soils with considerable organic content are brown or black, and have a loose, crumbly consistency. Such

soils easily absorb and retain air and water and are rich in the minerals necessary for plant growth. Organic material also provides an excellent environment for burrowing organisms, which help keep the soil loose. As the organic matter decomposes, it makes additional nutrients available to plants.

A deficiency of organic matter in soil is a common problem in agricultural fields and backyard gardens. Farmers often plow under a “cover crop” of rye grass or alfalfa into the soil to increase the soil’s organic content. Home gardeners often add organic supplements to garden soil before planting vegetables and flowers.

The alum-profile test separates the soil into its different components (organic matter, dissolved minerals, and undissolved minerals, in order of their density: lightest on top). Using this test, the youngsters test their local soil and compare the organic content to that of a commercial garden mix. The youngsters will probably discover that the local soil is low in organic matter. The kids then determine how much organic matter (compost, manure, or leaf mold) they must add to the local soil to match the organic content of the commercial mix.

CHALLENGE: MAKE YOUR OWN ORGANIC-RICH SOIL.

MATERIALS



For each team of two:

- 2 clear plastic vials* about 1" in diameter and 2" high
- 1 digging tool (spoon or trowel*)
- 1 cup of commercial garden mix*
- 2 cups of organic material (manure, compost, peat moss*, or leaf mold)

For the group:

- 1 waterproof pen*
- 1 small jar of alum* (available at most drug stores)
- paper towels*
- 4 liters of water or a water source
- extra vials* (to measure water and organic material)

Optional for "Branching Out":

- vegetable seedlings or seeds*
- half-gallon milk cartons

* Available from Delta Education.

PREPARATION



Group Size. This activity is suitable for both large and small groups.

Time. Allow forty to fifty minutes for this activity.

Site. Areas with lots of bare, hard ground (such as vacant lots, school fields, or your backyard) are excellent sites for *Super Soil*. The soil in these areas is usually low in organic matter. Do alum-profile tests on both the commercial mix and the soil at the potential site to make sure that the site soil is low in organic matter. (See the "Making the Alum-Profile Test" section.)

Materials. Using a waterproof pen, mark a line on each vial one-fourth of the way from the bottom of each vial.

ACTION



Collecting Soil

1. Show the commercial garden mix to your youngsters, and tell them that it is an excellent soil for growing vegetables and other plants. Explain to the youngsters that they will use this soil as a standard and compare other soils to it.
2. Point out the site boundaries to the youngsters, and explain that they will be collecting soil samples.
3. Divide the group into teams of two, and give each team a digging tool and a paper towel. Ask each team to bring back a handful of soil on a paper towel.
4. When everyone returns, ask the kids to compare the color, smell, and texture of the commercial mix with their own samples.

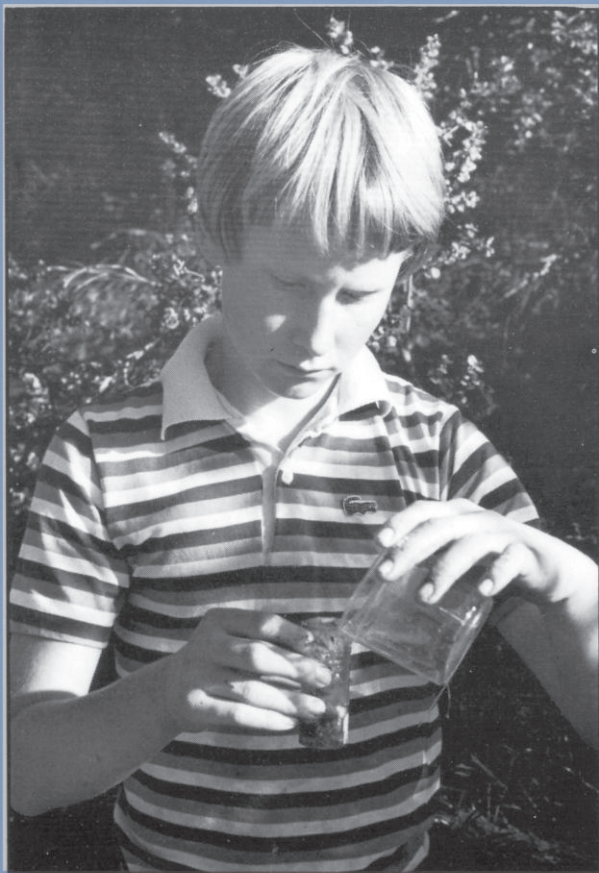


Making the Alum-Profile Test

1. Introduce the alum test as another method of comparing soil samples. Use the commercial mix to demonstrate the test. (For a large group, prepare two or three demonstration vials. These vials will serve as standards of comparison for the youngsters to use with the tests of their soil samples.)

2. The Test

- Fill a vial to the one-quarter mark with the soil to be tested. Add a large pinch of alum.
- Fill the vial with water, cover the vial with your palm, and shake the vial vigorously.
- Set the vial on a flat surface, and let the material settle for at least one minute. Be careful not to disturb the vial.



SUPER SOIL



LOCAL SOIL

(Note to leader: In a complete profile, the organic matter forms a dark layer immediately below the top layer of water. Some organic matter may float at the top. Below this layer will be layers of minerals and sand, increasing in coarseness as they get closer to the bottom. Suitable soil for this activity (low in organic content) would either not produce this dark layer or produce a very thin layer in comparison with the commercial mix.)

- Show the youngsters how the commercial soil separates into different layers, producing a *profile*.
- Distribute empty vials to the youngsters, and ask the teams to make soil profiles of the samples they have collected at the site. Leave the commercial-mix vials out for the youngsters to use as comparisons.
- Have the kids compare the profiles of their vials with the commercial-mix vials. Are the colors similar? How are the layers of material in the vials the same or different? If the kids don't notice the difference in the organic-matter layers, point out how much wider the layer is in the commercial-mix vial than in their soil-sample vials. Identify this top layer as the organic matter present in the soil. Tell the youngsters what organic matter is, and explain its importance to the soil. (See the "Background" section.)



6. Now ask the kids to look for soil that is more like the commercial mix than their first samples were. Let them test their new samples with the alum test.

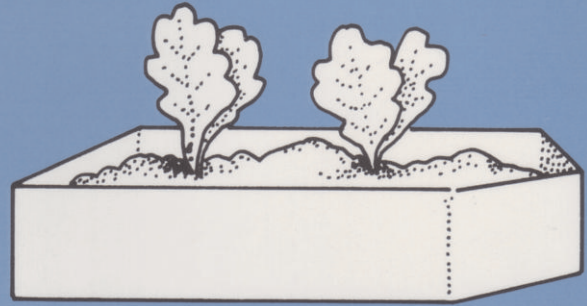
7. Show the youngsters the organic material you have provided (compost, manure, peat moss, or leaf mold). Tell the kids that this material is the kind of organic matter that is often mixed with poor soils to improve them.

8. Challenge the kids to find out how much organic matter they must add to a sample of local soil in order to get an alum-test result that closely matches that of the commercial mix. Encourage each team to use a spare vial to measure the organic supplement. Explain that they can mix different amounts of organic supplement and local soils on a paper towel, and then conduct an alum test on a sample of that mixture. (For example: A mixture of two vials of local soil plus one-half vial of compost might give an alum test close to that of the commercial mix.) Tell the youngsters that there are good soils other than commercially prepared mixtures.

BRANCHING OUT



1. Let the kids take the equipment home to do alum tests in their own backyards.
2. Ask the kids to mix their own good soil and then plant seeds or seedlings in it. Here are some planting instructions:
 - a. Cut one side out of a half-gallon milk carton, and staple the spout closed.
 - b. Poke two holes in the bottom of the carton for drainage.
 - c. Fill the carton nearly to the top with your homemade soil.
 - d. Plant seeds or seedlings, and water them. Peas, beans, lettuce, and Swiss chard are easy to grow.
 - e. Water regularly, but don't overwater.



WHAT DO YOU THINK?



1. How different are the profiles of soils from different areas of the study site? Why do you think they are different?
2. How much organic supplement did you add to the sample of local soil to get an alum test similar to that of the commercial mix?
3. What do you think makes up the other profile layers?
4. How could you make or gather your own organic supplements to improve your soil at home?