COOPERATIVE EXTENSION SERVICE • THE UNIVERSITY OF MARYLAND

SOILS

UP FROM THE SOIL

SOIL ORGANIC MATTER 4-H 318

As plants and animals die, their bodies decay and become a source of soil organic matter. Organic matter in the soil is important for a number of reasons: it increases the soil's water holding capacity; it improves soil tilth (makes it more crumbly); it stores plant nutrients; and upon decomposition, it may also supply nitrogen and other nutrients to the plants. Soil organic matter brings food and energy to bacteria and other forms of life in the soil.

Soil organic matter consists of plant roots, plant residues, very small soil organisms (microorganisms) both living and dead, and macroorganisms such as earthworms and insects. Two of the major plant nutrients, nitrogen and phosphorus, are contained in organic matter. In fact, 50 to 99 percent of the total soil nitrogen, about 50 percent of the total soil phosphorus, and about 75 percent of the total soil sulfur and other essential nutrients are found in soil organic matter. These nutrients can slowly become available to plants when the organic matter decomposes.

Humus is the well-decayed portion of soil organic matter. The individual particles are very small, or colloidal. These tiny colloids not only contain nitrogen, phosphorus and sulfur, but they have the ability to absorb onto their surfaces large quantities of plant nutrients which are then available for plant growth. Organic matter also increases aggregate stability (as we learned in 4-H 317). This increases the water-holding capacity of the soil. Thus, soil organic matter makes several important contributions to soil fertility.

Experiment

You can demonstrate the fact that organic matter plays an important role in soil fertility with the following experiment.

Collect these supplies:

1. A hoe or spade.
2. Four plastic bags of at least 1-liter (about 1-quart) capacity.
3. Four flower pots or containers with drain holes punched in the bottom.
4. Bean seeds.

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Procedure

1. Find a road cut or ditch bank at least 120 cm (4 feet) deep.

2. Remove a 5-cm (2-inch) layer of soil about 60 cm (2 feet) wide and at least 120 cm (4 feet) deep along the side of the bank. Discard this soil.

3. Label the plastic bags 1, 2, 3 and 4.

4. Fill bag #1 with topsoil (0 to 15 cm, or 0 to 6 inches deep), bag #2 with subsoil (30 to 45 cm, or 12 to 18 inches deep), and bag #3 with soil 90 to 120 cm (3 to 4 feet) deep.

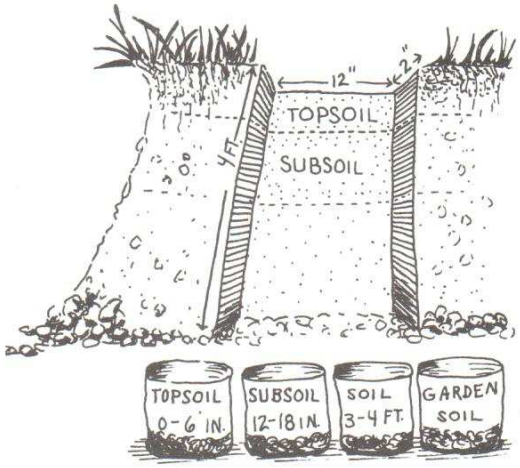
5. Place a sample of good topsoil from your flower bed or garden in bag #4.

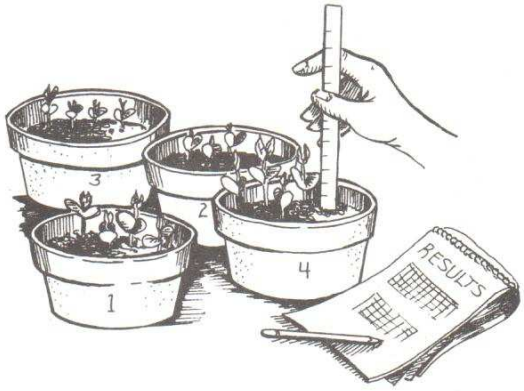
6. Fill the pots or containers to within 2.5 cm (1 inch) of the top with the soil you have collected. Be sure to label the pots 1, 2, 3 and 4 to remember which pot contains which soil sample. (Sample #1 in pot #1, etc.)

7. Plant 6 to 8 bean seeds about 2.5 cm (1 inch) deep in each pot. Add water as required.

8. When plants come up, thin to four healthy plants per container. (The number of plants will depend upon the container size.)

9. Record plant growth (height) at weekly intervals.





Results

	Weeks										
Containers	2	3	4	5	6	7	8	9	10	11	12
	inches										
1. Topsoil											
2. Subsoil											
3. Soil 90 to 120 cm (3 to 4 feet) deep											
4. Garden soil											

On which soil did the plants grow best? Why? _____

On which soil did the plants grow poorest? Why? _____

Was the topsoil darker than the subsoil? Why? _____