

It All Comes From Soil

Approximate Length of Activity: One class period for initial lesson, plus up to six weeks to complete plant growing experiments.

Objectives:

Teacher:

1. Demonstrate to students that cultivating the soil is basic to producing crops. The study of soils and their effect on plant growth provides vital knowledge to the farmer and directly affects farm production.

Students:

1. Students will be able to measure various soil substances while understanding the concept of a fraction. They will prepare their soil mixtures using these skills.
2. Students will develop responsibility for watering their plants. They will observe, record, and interpret their results.
3. Students will categorize soil mixtures, record results, and discuss results of their investigation.

Wisconsin Model Academic Standards:

English Language Arts	C.4.2	C.4.3					
Math	B.4.3	B.4.4	D.4.1	E.4.2	E.4.4	E.4.5	
Science	A.4.5	C.4.2	C.4.5	D.4.1	D.4.7	F.4.1	F.4.2

Introduction:

All soil is composed of four basic components: air, water, minerals, and organic matter. Each component is important in supporting growth of plants. Potting soil is a rich mixture of the above materials, as well as added ingredients which help plants to grow. Some potting soil ingredients are: vermiculite, which is non-compactable and promotes water penetration; sand, which is semi-compactable and promotes water retention; and peat moss, which provides nutrients. The amount of each ingredient in the soil determines its suitability to plants. If the soil is poor, it becomes more costly to raise plants because fertilizers must be added.

Materials Needed:

- Sand
- Peat moss
- Potting soil
- Vermiculite
- Seeds
- Two styrofoam cups per student
- Permanent Marker
- Plastic tray to hold cups
- Beaker to measure water
- Pitcher to bring water to classroom if there is no tap in the room
- "Which soil mixture is best for plants?" worksheets
- Observation worksheets

Time Management:

1. Allow one hour the first day. To speed germination, soak seeds overnight before planting.
2. Allow 10 minutes every other day for watering and recording results. Allow an hour for discussion on the last day of the project.
3. Allow up to six weeks to complete the experiment, depending on the variety of seeds. Plant the seedlings far enough in advance of extended vacation periods to ensure that watering and maintenance will be uninterrupted for more than a three-day weekend.

Activity Outline:

1. Pass out styrofoam cups and review the concept of a fraction in relationship to $\frac{1}{2}$ of the cup.
2. Pass out the soil mixture worksheet and have students write in each plot the fractional material which will go there as follows:

	Sand	Peat Moss	Potting Soil	Vermiculite
Sand	$\frac{1}{2}$ sand $\frac{1}{2}$ sand	$\frac{1}{2}$ peat moss $\frac{1}{2}$ sand	$\frac{1}{2}$ potting soil $\frac{1}{2}$ sand	$\frac{1}{2}$ vermiculite $\frac{1}{2}$ sand
Peat Moss	$\frac{1}{2}$ sand $\frac{1}{2}$ peat moss	$\frac{1}{2}$ peat moss $\frac{1}{2}$ peat moss	$\frac{1}{2}$ potting soil $\frac{1}{2}$ peat moss	$\frac{1}{2}$ vermiculite $\frac{1}{2}$ peat moss
Potting Soil	$\frac{1}{2}$ sand $\frac{1}{2}$ potting soil	$\frac{1}{2}$ peat moss $\frac{1}{2}$ potting soil	$\frac{1}{2}$ potting soil $\frac{1}{2}$ potting soil	$\frac{1}{2}$ vermiculite $\frac{1}{2}$ potting soil
Vermiculite	$\frac{1}{2}$ sand $\frac{1}{2}$ vermiculite	$\frac{1}{2}$ peat moss $\frac{1}{2}$ vermiculite	$\frac{1}{2}$ potting soil $\frac{1}{2}$ vermiculite	$\frac{1}{2}$ vermiculite $\frac{1}{2}$ vermiculite

3. Assign soil mixture combinations to individual students, making sure that all possible combinations are assigned. Using a permanent marker, students should label a styrofoam cup with their name and their assigned soil mixture. They should punch a drainage hole in the bottom of their cup using a pencil. Using another styrofoam cup cut or torn in half as a measuring device, students should measure and mix their soil into their labeled cups.
4. Have students plant two seeds in opposite sides of their cup. Select a seed variety that is large enough to handle that will germinate in three weeks. Use the same seed variety for all students.
5. Discuss possible variables to your experiment, such as heat, water and light. Emphasize that controlling these variables helps validate the experiment.
6. Water pots with 30 ml of water every other day. Rotate the pots one quarter turn each time they are watered. Be sure that pots are placed in a well lit, warm location.

7. Once the seeds have sprouted, cut one seedling off at ground level. Do not pull it out or you may dislodge the remaining seedling. The plant is cut off because only one sample is needed and two plants would be too many for such a small space. Planting two seeds increases the chance that one will germinate.
8. Have students record plant observations daily, including: date of germination, soil conditions, direction of plant growth, color, number and size of leaves, etc.
9. Two or three weeks after germination, conclude the investigation and allow each individual student to discuss the results.

Which soil mixture is best for plants?

	Sand	Peat Moss	Potting Soil	Vermiculite
Sand				
Peat Moss				
Potting Soil				
Vermiculite				

