



ALISON A. POCKAT, ASLA
LANDSCAPE ARCHITECT / LAND PLANNER
106 Steepbank Dr.
Cary, NC 27518
(919) 363-4415

Soil Study - Lesson plan relating to Adam's Bubble
An Experiment into the Effect of Organic Matter in Soil

Summary

Soil is basically a structure composed of rocks and minerals that have been broken down to various finely ground particles called sands, silts and clays. These names describe the size of the particles and range from the largest particles of sand to the smallest of clay. These particles provide structure for the soil and are extremely important for plant growth, but a healthy productive soil requires organic matter otherwise known as humus. Without it, plants fail to thrive. Humus helps the soil retain moisture, provide air to the root system and provide nutrients to the plant.

A healthy soil contains the plant macro-nutrients of nitrogen, potassium and phosphorus and a host of micro-nutrients. These nutrients come from the particle breakdown and the breakdown and incorporation of organic matter into the upper layers of the soil. In addition, a healthy soil also contains pore space that allows for oxygen and carbon dioxide exchange. The final component is water in an amount sufficient to support plant growth but not to the point of excess that would kill plant growth.

This experiment will allow students to compare the soil enhancement and growth rates obtained from varying soil conditions.

Grade Level: 3 - 6

Duration:

Setup - 1 hour

Daily watering - 5 minutes

Observation - 15 minutes bi-weekly

Personnel:

Teacher or other adult

Costs:

Costs will vary depending on the materials that you select. The process can be made to be very minimal if you select to use recycled materials and provide some of your own labor.

Learning Objectives:

Students will learn through example and actual growth studies the difference in plant growth in soils with and without organic matter.

Students will obtain experience in scientific observation and measurement.

Materials:

- 3 - Clear plastic box with a lid that can easily be removed but will allow air to enter the box. A 52 - 64 quart clear plastic storage box approximately 26 x 16 x 12" deep works well for this.
- A container of water
- Clean sand
- Yard waste or other compost - this can be purchased in bag form from most garden centers or home improvement stores.
- seed - fast growing sunflowers or vegetables such as cucumber, green beans, peas or corn work well - look for a maturity time of 60 days or less.

For Observations:

- notebooks to record observations
- magnifying glasses
- 12" ruler and yard stick
- scale - a bathroom scale will work well

Procedure:

- Place all of the materials required out in one spot so that they can easily be reached as they are needed. Make sure that your containers have been washed thoroughly to ensure that no contaminating residues are left on the box. Punch small drain holes in the bottoms of each box.
- Fill one container with sand, one compost and one with half sand / half compost mixed well. Ensure that planting media within each container is filled to a depth of about one inch below the top. Clearly label each container for media content.
- Plant seeds according to packaging. You should plant three different types of plants in each container - for example you might choose to use sunflower, corn and cucumber. Ensure that the same three types of plants in the same planting ratios are placed in each of the three boxes.
- Weigh each container and note initial planting weight in experiment notebook.
- Place the boxes in a sunny location protected from deer and rabbits and water each thoroughly. Ensure that the same amount of water is provided to each of the three boxes. If planting prior to the last killing frost of the year, ensure that the plants are protected from frost (containers can be placed in a sunny window if the experiment is to be initiated in early spring).
- Until germination, water each box daily. Ensure that the same amount of water is provided to each of the three boxes.
- After plants have reached the stage where they are an inch tall, water every other day.

Observation:

After the plants have reached a height of two inches begin to record observations. Observations should be made bi-weekly for a period of eight to nine weeks. Record the following information for each of the three conditions separately but in a way that will make comparison easy (you could record in three separate columns for example - or use the observation sheet provided):

- Measure the average height and spread of each of the three types of plants in each of the three containers.
- Use the magnifying glasses to observe root growth through the containers
- Weigh each container
- Note overall health and color of plants
- Note the initiation and completion of flowering
- Note fruit production - quantity, size and quality

Conclusions:

- Compare the data recorded over the life of the experiment. Make a mid-experiment (at the conclusion of five weeks) report on the growth observations. Predict final outcomes.
- Write a conclusion report of the results of the experiments.

What differences in growth rate and plant maturity were noted?

What differences in overall plant mass (height, spread and mass as recorded by weight) were observed between the different media?

What differences in flowering and fruiting were noted - time of flowering, quantity of flowers and fruit, length of flowering?

What differences in root quantity (amount of observable fibrous root mass), and overall distribution can be observed?

Based on your observations, what conclusions can you make concerning the best of the three plant media utilized? What changes would you recommend for future plant media mixes?

Soil Study Observation Sheet

Container Media: _____

Date	Height / Spread	Root Growth	Weight	Initial Flowering / Flowering Quantity	Initial Fruiting / Fruit Quantity	Notes
------	--------------------	-------------	--------	---	--------------------------------------	-------
