

Why Buy Dirt?

Standards of Learning

Science LS.1, LS.7, LS.12

Objective

The student will be able to:

- create and test hypothesis
- test soil pH
- diagnose nitrogen, phosphorus, and potash levels
- analyze data and make recommendations to amend soil levels

Materials

- 1 cup potting mix
- 1 cup potting soil
- 1 cup Soil sample from home
- 1 gallon distilled water
- 3 clear plastic cups
- 3 plastic spoons
- dropper
- Rapitest Soil Test Kit
- Periodic Table

Background Knowledge

Why do we purchase soil for planting trees, vegetables, and flowers when it is plentiful all around our yards? Is there an increasing value in this dirt? Why do some bags of soil feel light and fluffy while others are heavy and dark? The dirt in my yard doesn't look anything like what is in the bag, why? Asked your class these questions and many answers and hypotheses will surface.

Soil is a loose mixture of rock fragments and organic material. The fragments are formed from many years of weathering, water, and the influence of other living organisms. Topsoil is the upper layer and is the richest part of the soil for plant growth. It contains humus or decaying matter which adds nutrients. Three tiny particle varieties are present in the topsoil including sand, silt, and clay. Topsoil is essential for plant growth and provides support and nutrients for plants. Subsoil and bedrock are the other two layers beneath the topsoil. These layers lack the essential nutrients and minerals needed for plant growth.

Plants absorb nutrients from the soil. Soil composition and acidity determines the extent to which nutrients are available to plants. The primary nutrients needed by plants are nitrogen (N), phosphorus (P), and potassium also referred to as potash (K). Plants require large amounts of these nutrients for growth and survival.

pH levels significantly affect the presence of nutrients in the soil. Primary nutrients are less available in soil with a low pH. Ideally soil will be at a neutral level of pH 7. Lime is often used to raise the pH level of soil with high acidity

Nitrogen is essential for the production of proteins, enzymes, and metabolic processes involving



energy transfer. Nitrogen is required for photosynthesis and is a part of chlorophyll. The nitrogen cycle further explains how nitrogen is replaced in the soil.

Phosphorus is important for agriculture because it improves water retention, yield, nutrient value, color, texture, and disease resistance in crops. It is a necessary element for the process of photosynthesis. Phosphorus is found in organic materials and is known for stimulating plant growth from roots to blooms.

Potash, also known as potassium (K), is absorbed by plants in large amounts. It helps in building protein, photosynthesis, and reduces the chances of disease. Potassium may be found in soil naturally, in organic material, or in chemical fertilizer.

Basic soil samples from yards, fields, and wooded areas will vary in levels of pH, elements, and nutrients needed to grow healthy plants. Top soil and potting mixes are a combination of ingredients to provide balanced pH and rich growing medium for plants. For this reason many people add purchased topsoil, mulch, fertilizers, and peat moss to new garden spots or even when planting trees and shrubs.

“Why Buy Dirt?” allows a student to investigate the value of a rich balanced soil.

Procedure

1. Create a hypothesis regarding why people often buy soil rather than use what is in the yard to plant flowers, garden plants, and shrubs.
2. Using the back side of the periodic table poster discuss appropriate pH levels for soil along with key indicators of balanced quality soil.
3. Measure 2 tablespoons of potting mix in one plastic cup and add 10 tablespoons of water. Stir mixture thoroughly. Allow mixture to settle for 30 minutes or more.
4. Set up nitrogen comparative cylinder on flat surface. Open comparators capsule and empty the contents for nitrogen into the small side of the nitrogen cylinder. Using a dropper add liquid from the potting mix sample to the small side of the cylinder. Place the cap securely on the nitrogen cylinder and shake thoroughly until comparative powder is dissolved into the liquid.
5. Wait 15 minutes for solution to settle to a color. Match solution color to cylinder color chart to determine amount of nitrogen present in potting mix.
6. Discuss results with students and possible solutions to situations of deficit or surplus samples.
7. Repeat process using phosphorus and potash test using potting mix sample.
8. Record results from each test.
9. Conduct a pH test as a final soil analysis. Use the pH test cylinder.
10. Add potting mix granules to the small side of the cylinder. Add contents from the comparator capsule. Using the dropper add distilled water to the fill line.
11. Secure cap on cylinder and shake vigorously for 30 seconds or until sample is mixed well.
12. Wait 5 minutes and record results.
13. Repeat steps 1-10 with each remaining soil sample.
14. Discuss if hypothesis was correct and why.
15. Answer the question, “Why buy dirt?”



Charts

Soil Sample	pH	Nitrogen (N)	Phosphorus (P)	Potash (K)	Recommended Amendment
Potting mix					
Potting Soil					
Soil Yard Sample					
Soil Field Sample					

Extension

- Investigate how to amend soil. Use Rapitest Soil Test Kit charts to determine the best fertilizer mix for each sample.
- Use Rapitest Soil Test Kit pH Preference List to determine the best plants and crops for the soil samples.

Resources

- Rapitest Soil Test Kit from Luster Leaf Products at <http://www.lusterleaf.com>
- <http://www.soiltest.vt.edu>
- <http://www.lowes.com/lowes/lkn?action=howTo&p=LawnGarden/soiltest.html>
- <http://www.humeseeds.com/soiltest.htm>
- <http://www.humeseeds.com/soilph.htm>
- <http://www.ncagr.gov/cyber/kidswrld/plant/nutrient.htm>

