



Classroom Teacher Preparation

Earth Science 13: Soil Nutrients

Please use the following to prepare for the next SfS lesson.

Description:

While plants do not need soil for photosynthesis, it is often a source of nutrients for optimal plant growth and success. In this activity, students will test various samples of soils for the three primary macronutrients (Nitrogen, Phosphorus, and Potassium or N-P-K) and use their data to formulate an argument for which soils are best for healthy plants.

Lesson Objectives – SWBAT (“Students Will Be Able To...”):

3rd-8th

- Measure, report, and compare Nitrogen-Phosphorus-Potassium (NPK) nutrient values from a variety of growing mediums (“soils”), including decomposed plants and animals (“compost”).
- Recognize that nutrients, from decayed organic matter such as plants and animals, can be recycled through decomposition.

Disciplinary Core Idea (DCI)

LS2 Ecosystems: Interactions, Energy, and Dynamics - LS2.B: Cycles of Matter and Energy Transfer in Ecosystems

- (3rd-5th) Matter cycles between the air and soil and among organisms as they live and die.
- (6th-8th) The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. Food webs model how matter and energy are transferred among producers, consumers, and decomposers as the three groups interact within an ecosystem.

Science & Engineering Practice (SEP)

Analyzing & Interpreting Data

- (3rd-5th) Compare and contrast data collected by different groups in order to discuss similarities and differences in their findings.
- (6th-8th) Analyze and interpret data to determine similarities and differences in findings.

Crosscutting Concept (CCC)

Patterns

- (3rd-5th) Patterns can be used as evidence to support an explanation.
- (6th-8th) Macroscopic patterns are related to the nature of microscopic and atomic-level structure.

Preparation:

This lesson is best taught after students have been exposed to basic plant structure and function, photosynthesis, and food webs/pyramids. The experimental procedure can be challenging for younger students, these classes may need extra time and help to complete the chemical testing.



Room Set Up for Activities:

Students will be working in groups of 4 and will need 1 cleared desk per group for experimental set-up.

Safety:

There are no safety concerns with this lesson.

Related Modules

This lesson may be taught as part of a sequence or group of related modules on **Ecosystems**. Modules include:

Earth Science 14: Soil Properties - This lesson introduces students to the characteristics and formation of soil. Students will examine the color, texture, and field capacity of soil, and discuss the importance of soil for plant life.

Life Science 5: Food Webs - This module teaches the basics of food webs. Students first construct a food web model for a simplified Yellowstone ecosystem. They then consider what would happen to the ecosystem if the food web were disrupted by the removal of a native species and/or the introduction of an invasive species.

Life Science 22: Photosynthesis -The Game - Students work in pairs to model photosynthesis through an interactive game. From their game evidence, students then develop an argument that plants need sunlight, carbon dioxide, and water to make food.

For other module sequences and groups, look here: www.sciencefromscientists.org/sequences

Standards Covered:

Please click the following link to our website to review the standards covered by this lesson, listed by state: www.sciencefromscientists.org/standards/

Lessons are matched to both national NGSS and local state standards.

After Our Visit:

Extend this lesson with the online game and/or an activity booklet about composting.

https://d3tt741pwxqwm0.cloudfront.net/WGBH/ess05/ess05_int_compost/index.html (Note: requires Adobe Flash to run.)

http://www.cvswwd.org/uploads/6/1/2/6/6126179/do_the_rot_thing_cvswwd1.pdf

Access this Extension activity by visiting the Classroom Post found on our website at sciencefromscientists.org/cohorts. Use the name of your school/cohort and password to log in.

To help Evaluate, check out our Open Response questions online at sciencefromscientists.org/open-response-questions. They are freely available for all of our lessons for current teachers. Use the password supplied by your instructor to log in.

Additional Resources:

- Soil Composition (from Think Garden) (2:26): <http://mass.pbslearningmedia.org/resource/thnkgard.sci.ess.soilcomp/think-garden-soil-composition/>
- Soil Nutrients (from the Ground Up) (1:34): <https://www.youtube.com/watch?v=gBrhZKuG-HY>