



Classroom Series

Nitrogen in Soil Lab

Code 5968



Lesson Plans are provided to help organize an existing curriculum, allowing the teacher to spend more time on hands-on activities that meet key classroom learning objectives and improve student achievement. The Lesson Plans will aid the teacher in integrating LaMotte test kits and equipment into classroom activities that meet National Science Education Standards.



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Concept/Topic:

Introduction to soil nitrogen and demonstration of a simple test procedure.

Time Requirement:

One class/lab period

Subject Area(s):

Environmental Science, Biology, Earth Science

General Goals:

1. The students will gain a basic understanding of soil nitrogen.

Specific Objectives:

- 1 Students will be able to list sources of nitrogen in soil.
- 2 Students will be able to explain how nitrogen is removed from the soil and used by plants.
- 3 Students will be able list the symptoms of insufficient or excess nitrogen.
- 4 Students will be able to follow instructions and work together as a team.
- 5 Students will be able to make observations.
- 6 Students will be able to collect and analyze data, and draw a conclusion.

Materials, Required:

Order Code	Description
5968	Classroom Studies, Nitrogen in Soil Lab
2-2146	Safety Goggles
2-2234	Gloves
	Timer/clock

Materials, Optional:

Order Code	Description
	Soil Samples
5425	Topsoil Tour
5913	Nitty Gritty Soil Science Kit
5679	Garden Guide Kit

Anticipatory Set (Lead-In):

Plants need air, light, water and nutrients to grow. Some of the nutrients used by plants are found in the upper layers of the Earth's soil. Nitrogen is one of the most important nutrients. Nitrogen dissolves in the water in the soil and then plants absorb it through their roots. The nitrogen solution travels up from the roots to the stem. It is then transported through tubes in the stem to other parts of the plant.

Nitrogen is responsible for rapid plant growth and healthy green leaves. Sufficient nitrogen is especially important for leafy, green vegetables like spinach, lettuce, and cabbage, and for forage crops like soybeans, alfalfa, and corn. Manure, compost and commercial fertilizers are the most common source for adding nitrogen to the soil.

It is important to have the correct amount of nitrogen in the soil. Plants that don't get enough nitrogen won't be healthy. Giving a plant too much nitrogen is just as bad as not giving it enough. Too much nitrogen can affect the amount of sugar and vitamins in fruits and vegetables, which will change the way they taste. Excess nitrogen can build up in plant tissues of leafy vegetables and poison livestock that eat them.

Preparation:

Read the manual to become familiar with the text and test procedures. Prepare and package a set of items for each of the 5 teams. Decide how to divide the students into 5 teams. Make a copy of the Student Procedures for each team.

Step-By-Step Procedures:

1. Divide students into 5 groups.
2. Present the Introduction lecture material.
3. Pass out a set of bagged items to each team.
4. Have members of each team decide on the duties of each member. For example, instruction reader, reagent adder, mixer, timekeeper, result recorder etc.
5. Read instructions aloud, one step at time, as students perform the Testing Soil for Nitrogen procedure.
6. Discuss students' results.

Plan for Independent Practice:

Have students review additional information on soil on websites included in the Resources section. Have students read and become familiar with Student Procedures.

Closure (Reflect Anticipatory Set):

The proper amount of nitrogen in soil is needed to produce healthy plants. Human activities can have an impact on the nitrogen cycle, resulting a deficit or excess of nitrogen in the soil. The harvesting of crops and cutting down forests can result in a decrease of nitrogen in the ecosystem. Over-fertilizing, animal waste and sewage can increase nitrogen levels. Soil tests are done to determine the soil nitrogen level.

Assessment Based on Objectives:

Have students:

- list two sources of nitrogen in soil.
- explain how nitrogen travels through the plant from the roots and is turned into food by photosynthesis.

describe the visible symptoms of a plant that has too little or too much nitrogen in the soil.

Adaptations (For Students With Learning Disabilities):

- Provide written and verbal instructions for test procedures.
- Provide a copy of lecture material.
- Give students a copy of the Student Procedures ahead of time so they may become familiar with the instructions.

Extensions (For Gifted Students):

- Have students draw a diagram of the nitrogen cycle with an emphasis on plants and soil.
- Have students follow suggestions in the manual for Additional Experiments.
- Have students use terms in the Glossary to create a nitrogen in soil crossword puzzle.

Possible Connections To Other Subjects:

Social studies—land use and urbanization

Resources:

Literature

NASA Soil Science Education
<http://ltpwww.gsfc.nasa.gov/globe/>
Sci4kids
www.ars.usda.gov/is/kids/soil/soilintro.htm
National Gardening Association
www.kidsgardening.com

Equipment

LaMotte Company
www.lamotte.com
Review and order additional equipment

National Science Content Standards Addressed

A Science as Inquiry

All students should develop:

- Abilities necessary to do scientific inquiry
- Understanding about scientific inquiry

C Life Science

All students should develop understanding of:

- Population and ecosystems

D Earth and Space Science

All students should develop understanding of:

- Structure of the Earth system

E Science and Technology

All students should develop:

- Abilities of technological design

Resources

National Resource Council (NRC). 1996. *National Science Education Standards*. Washington, D.C.: National Academy Press.