

GROW YOUR PALS PROGRAM GUIDE



THE NATIONAL FFA MENTORING PROGRAM

Sponsored by



LESSON 1.11

Running and Jumping Soil

Unit:
PLANTS AND GARDENING

PRECEPTS

A. Action

- A1. Work Independently and in Groups
- A2. Focus on Results

NATIONAL STANDARDS

NS.K-4.4 Earth and Space Science



Lesson Type:
Small Group

STUDENT LEARNING OBJECTIVES

As a result of this lesson, the student will...

- Define the term *erosion*.
- Identify the effect running water has on soil.
- Identify methods to prevent reduce *erosion*.





TIME

Instruction time for this lesson: **30 minutes**.



RESOURCES

National FFA Organization. (2003). LifeKnowledge Precepts and Signs of Success



TOOLS, EQUIPMENT AND SUPPLIES

- ✓ Potted plant
- ✓ One large clear jar (*approximately 1 gallon*)
- ✓ Soil – use soil that has little or no organic matter
- ✓ Cup for water
- ✓ Plastic pan – one per student - 12” x 12” x 5”
- ✓ One cardboard pan divider (*can be made from old boxes*) - 5 inches wide by 12 inches long
- ✓ Tape – masking or plastic
- ✓ Soil – enough to fill each plastic pan (*See PALS1.11.SG.AS.C*)
- ✓ Grass clippings or shredded newspaper - enough to cover one half of each pan - one cup per student
- ✓ Pitcher of water - large enough to fill all students’ cups with water
- ✓ One spray bottle for misting

KEY TERMS



The following term is presented in this lesson and appears in ***bold italics***:

Erosion



CONTENT OUTLINE

Objective 1. | Jumping Soil

- A. Place one inch of soil in clear jar.
- B. Slowly pour drops of water in soil until soil splatters to the sides of the jar.

Objective 2. | Show ***Erosion*** Pictures

- A. Splash ***erosion***
- B. Gulley ***erosion***

Objective 3. | *Erosion* Experiment

- A. *Erosion* on bare soil
- B. *Erosion* on mulched soil

Objective 4. | Identify methods of reducing *erosion*

- A. Mulching with grass, leaves, straw

INTEREST APPROACH

Instruct students to move their chairs into a semi-circle. Stand in the middle where students can easily see you. Hold a potted plant up for the group to see. Ask students to identify elements needed for the plant to grow. Answers will range from light, water, air, fertilizer and, hopefully, soil. If no one guesses soil, ask leading questions such as “What keeps the plant from blowing away? Where are the plant’s roots? Where does the plant get water from?”

Once soil has been identified as a key element, ask students if they have ever seen soil move. Most probably will say no, some may say yes, when the wind blows and dirt is in the air. Set them up for the lesson by stating, “Today you will get to see soil run and jump.”



Good morning (or afternoon) everyone. The first thing we are going to do is arrange our chairs in the shape of a half circle. When I say CIRCLE UP, pick up your chairs and place them in the form of a half-circle beginning here.

Point to where you want the semi-circle to begin.

CIRCLE UP!



Look at this plant; let’s answer some questions about this plant. Please raise your hand if you know an answer to a question. Nod your head “yes” if you are ready for the question.

What does this plant need to keep growing?

Call on students as they raise their hands until someone guesses soil. If they say dirt, correct them and say “We call it soil.” If a student guesses soil, proceed to Objective 1. If they do not, ask the following questions:



We have some of the elements needed for a plant to grow, such as water, light and warm temperatures, but we need one more thing. Where do the roots of a plant go? Correct! The roots are in the soil.



Did you know that soil moves? What happens if the soil moves?

Allow students to respond; most will not know what to say.



If the soil is not present, plants can't grow. Soil sometimes runs and jumps. Let's find out how.

SUMMARY OF CONTENT AND TEACHING STRATEGIES

OBJECTIVE 1. | Define the term *erosion*.



I. Jumping Soil

- A. Place one inch of soil in clear jar
- B. Slowly pour drops of water in soil until soil splatters to the sides of the jar

Obtain a large, clear jar, approximately one gallon in size. Place approximately one inch of soil in the bottom and gently shake the jar to level the soil out. Fill a small cup half full with water. Arrange students in a semi-circle so they can easily see the jar and soil in it. Hold the cup at the top of the jar and slowly pour a small amount of water into the jar so it flows out of the cup it drops. The falling drops will cause the soil to splatter, or “jump” onto the sides of the jar. This will show students one way that soil moves.



Look at the jar I am holding. Place your finger on your nose if you can see the soil in the bottom of the jar. Great! It looks like we can all see the soil. Watch the soil carefully. We are going to see if the soil “jumps” when water enters the jar.

Slowly dribble water into the jar until soil splatters onto the sides.



Did you see the soil jump? Where did it jump to?

Pause for response.



Correct, it jumped up on the side of the jar. Raise your hand if the soil is supposed to be on the side of the jar.

Pause for response.



If you didn't raise your hand, you are right! The soil should be in the bottom of the jar.

II. Show *Erosion* Pictures

C. *Splash erosion*

D. *Gulley erosion*

Show students picture of splash *erosion* with PALS1.11.SG.AS.A



Look closely at this picture. You can see how water makes the soil move when it hits. It almost looks like an explosion. That drop of water breaks the soil down and causes it to move.



When water moves soil from where it is supposed to be to somewhere else, or breaks the soil down, we call that *erosion*. In the jar, the soil moved from the bottom to the sides. We can easily wash the soil back into the bottom of the jar. However, outdoors in a garden, along road sides or in a farmer's field, if water moves the soil, it can be almost impossible to put it back. If this happens, plants can't grow where *erosion* took place.

Show students PALS1.11.SG.AS.B. Trace the path of the water movement with your finger so students can see where the soil "ran" down the hill. Be sure to point out there are very few plants growing where *erosion* took place.



Look closely at this next photo. Let's trace how the water moved. The moving water caused soil to run down the hill. There are very few plants growing where the soil was carried away.



Would you like to see how this happens? Great!

OBJECTIVE 2: Identify the effect running water has on soil.



NOTE: The following will need to be constructed in advance of this lesson: You will need to obtain one plastic 12" x 12" x 5" pan for each student. Using cardboard boxes, cut out strips of cardboard that are 12" long and 5" wide. Use these pieces to divide the plastic pans in half. Secure with tape. Fill each side of plastic pan with equal amounts of soil. Slope soil from one end of pan to other to form a side slope for water to run down. (See diagram in PALS1.11.SG.AS.C for instructions). Leave one side as bare soil. On the other side, place grass clippings or shredded newspaper to form mulch. This represents ground cover used as a conservation practice.

III. Erosion Experiment

C. **Erosion** on bare soil

D. **Erosion** on mulched soil

Distribute pans of soil to each student along with one cup. Fill each student's cup half full of water. Instruct students to slowly pour water onto soil that is bare. After everyone completes this, fill the cups half full again and repeat the process on the side with the mulch. Lead students through a process to identify what problems are caused by water erosion and identify ways to conserve soil.



When I say CHAIRS, each person will take their chair from the half circle and move it to the tables. Once you are there, quietly sit down and wait for the next instruction. Where are you going to take your chairs? That's right, to the table. What will you do next? *Sit quietly and wait.*



Excellent!

CHAIRS!

After students are seated at tables, provide trays of soil and cup for each student.



Please leave the trays and cups where they sit until instructed to touch them. When will we touch the trays and cups? Correct, once we are given the instructions.

In a moment, we will conduct an **erosion experiment** with the soil in the trays. Notice that one side of the tray has soil that is bare and the other side has soil with grass clippings (or newspaper clippings). We are about to find out how each side reacts to water.

Firmly hold the cup on the table while I pour water into it. Once everyone has water, listen for the word RAIN. Slowly begin to pour the water on the bare soil until the cup is empty. Let's review.

How are you to hold the cup?

Pause for response.



Correct. Firmly on the table.

When will you begin pouring the water on the soil? *Pause for response.*

Right again. When you hear the word rain.

What side will you pour the water on? Right! The bare side.

How will you pour the water? *Pause for response.*

Great! Slowly, until the cup is empty.

Fill all cups half full of water.

RAIN!

Once all students have emptied their cups, explore what happened to the soil.



Let's find out what happened in the rain storm. Let's take turns describing what we saw when the water moved down the soil?

Call on one student at a time until all have shared an observation. Answers will vary from "It made a ditch" to "It got all muddy."



Remember this picture?

Hold up PALS 1.11.SG.AS.B.



Did anyone's soil run downhill like it did in the picture? When it rains, it causes unprotected soil to run with the water, leaving ditches. When this happens, it is known as **erosion** and is not good for the soil.

Now let's pour some water on the side with mulch and see what happens. Let's review the process again.

1. Hold your cup firmly while it's filled with water.
2. Wait until everyone has water.
3. When we say "Rain," slowly pour the water over the soil with the mulch.

Fill all cups half full of water.

RAIN!

Review with students the results of running water over mulched area.



Was anything different with the soil this time?



Students should be able to see that less soil washed away with the mulch.



That's correct! No ridges washed this time and there is less soil in the bottom of the pan.

OBJECTIVE 3. | Identify methods to reduce *erosion*.



IV. Identify methods of reducing *erosion*

A. Mulching with grass, leaves, straw



Based on the experiment, what could we do in a garden to prevent ***erosion***? In your pan, the side with clippings had the least ***erosion***. Take 15 seconds and visit with the person next to you about what we could place in an outdoor garden to reduce ***erosion***.

At the end of 15 seconds, have students raise their hands to give an answer, capture the answers on a writing surface that all students can see.



Time's up. Raise your hand if you have a solution to our problem.



We heard that grass clippings are helpful, and that is one way to reduce ***erosion***. Some other examples are leaves or straw. Farmers will leave cornstalks and wheat straw on their fields to also help prevent water from creating ***erosion***.



REVIEW / SUMMARY

To review, use a *Jump and Shout* review. Ask students to jump up from their seat and shout the answer to the questions. The goal is to have all students jump and shout the answers. For example, “What do we call it when water carries soil away? Students: **Erosion!**” If all students do not jump and shout the answer, follow up with: “**Erosion** – That’s correct! On the count of three, let’s all jump and say it together, 1, 2, 3 – **Erosion!**”



Let’s see what we learned today. When you hear the questions, jump from your seats and shout the answer.

1. What do we call it when water carries soil away?

*Answer: **Erosion***

2. Name one type of damage that water can do to soil?

Answers vary: wash it away, cause ditches, breaks soil down. Follow up with any answers not given. Example: “That’s right, it causes ditches. It can also wash the soil away.”

3. Name one thing we can do to our gardens or fields to stop **erosion**?

Answer: use mulch, grass clippings, straw, etc. Follow up with any practices not named by students. Example: “We heard grass clippings, are there any other practices we learned about?”

APPLICATION



One-on-One Idea

Instruct students to look for examples of *erosion* around their homes, streets or in books with photos of landscapes. Books that feature scenery of national parks will often have photos where *erosion* can be identified.



Large Group Idea

We poured a small amount of water on the soil in this demonstration. Imagine what would happen in a flood? How much soil could that move? What damage would result? Discuss as a large group the impact floods can have on agriculture.

PALS1.11.SG.ASSESS.A

Name _____

Correctly answer the following questions with True or False:

- _____ 1. When water carries soil away from a garden or field, this is called erosion.
- _____ 2. Water can wash deep ridges in fields that are not protected.
- _____ 3. It is not a good idea to put mulch on soil. Leaving the soil bare is best.



PALS1.11.SG.ASSESS.A | EVALUATION ANSWER KEY

1. True
2. True
3. False

PALS1.11.SG.AS.A

Types of Water *Erosion*

Splash Erosion – Caused by water dropping onto soil.



(Photo courtesy of University of Nebraska Plant and Soil Science Library)

PALS1.11.SG.AS.B

Types of Water Erosion (*continued*)

Gulley erosion caused by running water.



(Photo courtesy of the United States Geological Service)

PALS1.11.SG.AS.C

Creating an Erosion Field

1. Obtain a plastic pan approximately 12" x 12" x 5."
2. Using old cardboard, cut a pan divider 5" x 12."
3. Place cardboard divider in pan, dividing the pan in half.
4. Fill each side of pan with soil, sloping to one end. (See diagram below).
5. Mist soil with water until damp. Do not place so much water on soil that water begins to run.
6. Leave one side of soil damp. On the other side, place grass clippings if available. If not, use finely shredded paper such as newspaper. Before placing clippings on soil, mist with water until moist. Gently press the clippings into the soil.
7. Soil is now ready to pour water on for erosion experiment.

