

# MAKE IT RAIN: Soil Cover & Erosion

Minnesota Department of Agriculture

**Objective:** Students will be able to describe the impact of erosion on three different land surfaces: bare soil, leaf litter, and grass.

**Background:** Soil erosion impacts both farmland and the natural environment. When topsoil is eroded from an area the most nutrient-rich layer is typically lost, reducing the quality of the soil. This loss can impact crop yields and create a need for artificial fertilizers. The soil and nutrients washed away can disrupt the ecosystems of rivers, lakes, and wetlands. Additional sediment clouds the water, while added nutrients cause large algal blooms making it difficult for fish and wildlife that depend on those downstream waters for food and habitat. Lost sediment can deposit in new areas, blocking the flow of water in streams and clogging passageways, leading to additional flooding.

The quantity and speed of waterflow also impacts the amount of erosion. Water is powerful! (see the image at the end of this document). Surfaces that allow water to infiltrate, or soak into the ground, slow the water down and reduce erosion.

**For additional teacher background information please see the list of videos at the end of the lesson.**

## Activity:

**Primary video for students to watch:** Erosion and Soil (funsciencedemos): (7:35)  
<https://www.youtube.com/watch?v=im4HVXMG168>

### Watch video up to 1:37:

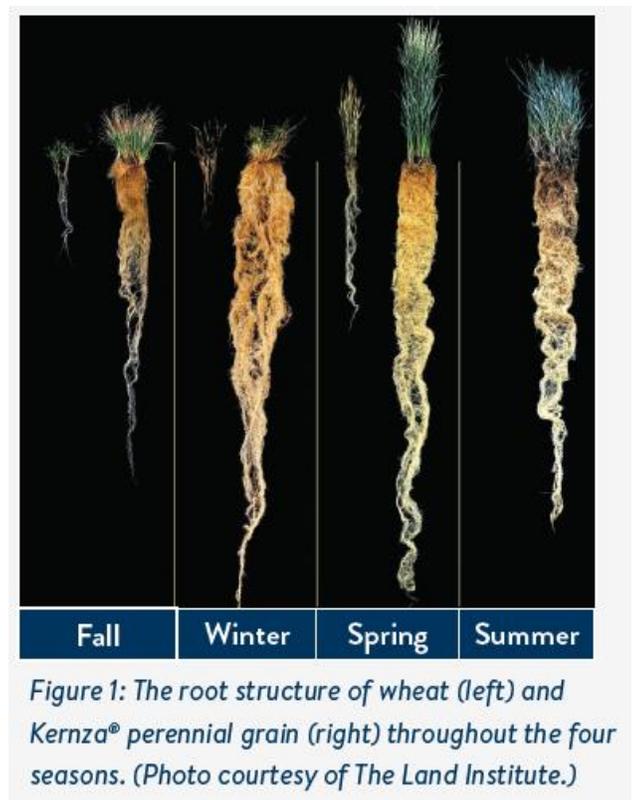
Have students hypothesize what will happen for each scenario. Guide them as much as desired. As he pours the water on each bottle of soil, do you think there will be any differences? Will the water that leaves the bottle and fills the cup look different between the three? Will it flow any differently off the surfaces (speed & quantity of runoff)?

### Watch video up to 4:50:

Have students discuss their hypothesis, were they correct? What was different? Why?

### Watch the remaining video:

Roots of plants are amazing aren't they! They were almost working as a sponge holding on to all that water. They really do a great job creating space for water to soak into the soil. Rain often follows the path of the root deep into the soil. Our native prairie plants have awesome roots, they can grow over 5 feet deep into the soil!



Farmers are working to prevent erosion. They work to cover their soil as much as possible. This can be done by leaving a crop residue on the soil after harvest (much like the leaves in the example from the video). After harvesting corn farmers leave pieces of corn stalk on the ground to protect the soil. Some farmers plant cover crops. Cover crops are planted just before or after a crop is harvested. The job of

this plant is to simply cover the bare soil until the next crop is planted. Sometimes these can be harvested, but not always. One last planting option to prevent erosion is to plant a crop to cover the ground year-round. One new crop Minnesota farmers are trying is a new wheatgrass called Kernza®. It has deep roots like our native prairie plants. Their roots are much deeper than the roots of wheat (Figure 1). Work is being done to plant Kernza in certain areas of the state to protect the quality of our drinking water. Its deep roots help prevent soil erosion and store nutrients. The University of Minnesota released its first Kernza variety, MN-Clearwater in 2019.

**Extension:**

What do you think happens to rain that falls on streets and sidewalks, parking lots, and other hard surfaces? Where does it go? It can move very quickly to our storm sewers and then to our lakes and rivers. As it travels over these surfaces, it washes them. What do we find on our streets, sidewalks, and parking lots that can be washed into our lakes and rivers? (oil, gas, grass clippings, dog poop, fertilizer, etc.) All these things can pollute our waters too.

For expansion of urban runoff and other topics directly linked to agriculture practices the first video listed at the end of this lesson is another great resource. It takes the runoff a bit further and includes additional scenarios.

**Possible Calls to Action:**

1. Look around your neighborhood or your yard. When it rains where will you see the most runoff? Are there areas where erosion or soil loss may occur? When it rains, go out again and see if your predictions were correct.
2. Soil erosion can pollute our lakes and streams, if you find areas of bare soil how can you protect the soil from erosion? Is there something you and your family can do?
3. We have a lot of hard surfaces in our neighborhoods. Where does the water for your street go? What types of pollutants can be carried with it?

**Additional Teacher Resources:**

1. Conservation station – Rainfall Simulator Demonstration (Iowa Learning Farms): (14:14) <https://www.youtube.com/watch?v=09k8gOSLO9k>  
4:08: Good discussion on urban runoff, comparison to porous pavers  
6:18: Discussion on tile drainage  
7:28: Mentions quality of runoff and impact on streams  
7:59: Artificial drainage turned back on, water moves down through the soil to reduce surface runoff  
10:13: Pollutants travel with sediment in runoff (10:47) tile water contains nitrate  
11:30: Practices to reduce erosion
2. Soil Erosion and Runoff Demo (University of Nebraska): (22:14) <https://www.youtube.com/watch?v=okPtNdcc2W4>  
This also discusses till/no till soil, soil health. Good example to discuss ag practices and impact on soil particle attachment.  
At 9:11: begins to show crust development and depth of penetration  
At 14:30: Soil settling out of jars
3. Rainfall Simulator- Soil Management Practices/Soil Health (Bayer Crop Science): (2:40) [https://www.youtube.com/watch?v=JEecN7nA-  
js&list=TLPQMTcwNjIwMjB1qoNEz3f7mw&index=2](https://www.youtube.com/watch?v=JEecN7nA-<br/>js&list=TLPQMTcwNjIwMjB1qoNEz3f7mw&index=2)

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This image is from the Natural Resources Conservation Service. It shows a magnified drop of water splashing onto the soil. See the power/explosion. Look closely and you can see the small particles of soil being displaced. This is the displacement of soil, soil cover protects this from happening.

