

**Lesson Title: How Does Cop Cover and Mulch Affect Soil Loss?**

**Ohio Standards Connection:**

**Standard(s):**

**Benchmark(s):** (grades 3-5) C Describe Earth's resources including rocks, soil, water, air, animals and plants and the way they can be conserved.

**Indicator(s):**

**Grade(5 )** Indicator 6 Investigate ways Earth's renewable resources (e.g., fresh water, air, wildlife and trees) can be maintained

**Lesson Summary:** Using soil boxes, students will compare how much soil gets carried off bare soil from rain as compared to soil covered with crops or mulch.

**Estimated Duration:** Class period

**Background:**

Grass (or cover crops) protects the pounding of raindrops and the movements of running water. The grass breaks up the force of the raindrops so that the soil is not pounded and broken apart by this impact. Grass roots also open up channels to let water percolate into the soil. As the water runs off, the grass also slows it down so that it doesn't have enough speed to disturb the soil.

Mulch protects the pores at the surface of the soil. It prevents the puddling or "running together" of the surface soil under the impact of raindrops. When puddles, it clogs the surface pores of the soil and does not allow the rain to soak in. Instead, it runs off over the surface. Dead plant materials also protect the soil from detaching under the impact of raindrops. In addition, mulch reduces evaporation by shielding the soil from the wind and the direct rays of sunlight. Another benefit of mulch is the organic matter it adds back to the soil as it breaks down.

**Instructional Procedures:**

1. Fill all three soil boxes with the same kind of soil.
2. Cover soil in one of the boxes with mulch material, another with sod and leave the last one bare.
3. Set the boxes on a table so that the spouts extend over the edge. Place a four by four piece of lumber or some other kind of prop at the other end of the boxes to give them slope.
4. Place clear containers on the ground or on a stool beneath the spouts of the boxes to catch water running out of the boxes.

5. Have 3 students pour water at approximately the same rate and at the same height at the top of the soils boxes. Pour steadily. Make sure that not too much water is poured on to the boxes so that it doesn't overflow the containers at the bottom.
6. Water will run off the soils boxes into the containers. (Tip: Waterlogged soil in the boxes will affect the experiment, so if you are going to repeat the experiment, let soil dry somewhat between repetitions).
7. Compare the length of time for water running out of each of the containers. Discuss why. (The water running out of the box with sod on top should take the longest to run out, the mulched box should take a little less time and water in the bare soil box should run out first. Once the box with the sod starts running, it will also run the longest.)
8. Is the amount of water carried out of the boxes equal? (The box with sod should hold onto more water.)
9. Compare the amount of soil carried out of the boxes in each of the containers. (The box with sod should look the clearest, the mulch next and the bare soil runoff water should be muddiest.)
10. Discuss why and how to prevent soil from being eroded off the land. Discuss implications of so much soil ending up in our waterways and the costs of the loss of topsoil.

**Materials and Resources:**

- Three wooden, water-proofed soils boxes-These can be borrowed from Cuyahoga SWCD or you can make your own out of aluminum or plastic pans. Paint trays also work well. To make your own wooden box, it should be about 16 inches long, 12 inches wide and 4 inches deep. Waterproof the inside of the boxes. At one end of each of the boxes, cut a v-shaped notch 1 to 1 ½ inches deep and fit with a spout to funnel water into a container.
- Three watering cans (can use only one, but will have to time the rates of flow separately)
- Three clear containers to catch water running out of the soil boxes
- Enough soil to fill the three boxes
- Sod from a pasture, lawn or fencerow to fit one of the boxes.
- Mulch material (may be straw, rocks or wood mulch)
- Water
- Four by four piece of lumber long enough for all three soil boxes to be propped up side by side (or something else to prop up one end of the soils boxes)

**Vocabulary:**