

SCIENCE FAIR LOG BOOK

Names: Shannen and Eldana

Research Question

How can we stop soil erosion and how does it affect us?

How does it affect us? (This part will be explained through a visual namely a board placed beside the experiment and making a short presentation to students)

Hypothesis

If three samples of soil, one with no ground cover, one with rocks and the other with grass are exposed to flowing water, the one with the grass covering will have the least amount of erosion and clearer drained water. The one with rocks will have muddier water with more erosion and the one with bare soil will have the muddiest water which shows the most amount of erosion.

Research

1. What is soil erosion?
2. How do you know that soil erosion has taken place?
3. How does soil erosion happen?
4. Types of erosion
5. How does soil erosion affect us?
6. How can we prevent soil erosion?

Variables

Independent/Manipulated Variable: Type of ground covering (bare soil, grass/plant, rocks)

Dependent/Responding Variable: The amount of soil/dirt collected in the mineral water bottles.

Controlled Variables

Same sized Pop bottles (3, 2L Pop bottles)
Same sized mineral water bottles (3)
Same amount of soil
Same dimensions of the hole cut in each pop bottle
Same height in each of the three mineral water bottles
Same amount of water poured at the same pressure

Materials

First experiment

Large cardboard box to place the pop bottles
3 large 2L Pop bottles
3 small mineral water bottles
Wire
Water
Rocks
Grass

Second experiment (Trial and error)

Large cardboard box to place the pop bottles
3 large 2L Pop bottles
3 small mineral water bottles
Wire
Water
Rocks
Mulch
Top soil
Clay soil
Balck earth soil

Steps in our first experiment

Step 1: Take 3 empty 2L Pop bottles and cut an equal size rectangular hole on top of each of them.

Step 2: Take a large rectangular cardboard box and place the 3 Pop bottles at equal distance from each other and paste them on to the box to secure them. Make three holes on the side edge of the cardboard box so that the bottlenecks can protrude from them.

Step 3: Take 3 transparent mineral water bottles. Cut the top part off horizontally, so that about $\frac{3}{4}$ of the bottle remains. Make two holes on either side of the cropped mineral water bottles and hang a wire connecting one hole to the other making it look like a bucket. Hang the three mineral water bottles onto the bottlenecks of the large Pop bottles that are protruding from the cardboard box. The mineral water bottles should hang outside on the bottlenecks.

Step 4: Fill all 3 Pop bottles with equal amounts of garden soil. Number the bottles. Leave the first with just bare soil. Cover the second with grass/plants and the third with rocks.

Step 5: Very slowly pour equal amounts of water from the furthest end of the pop bottles.

Step 6: Observe the quantity of soil and the color of the water that drains into the mineral water bottles.

Steps in our second experiment (Trial and error)

Step 1: Take 3 empty 2L Pop bottles and cut an equal size rectangular hole on top of each of them.

Step 2: Take a large rectangular cardboard box and place the 3 Pop bottles at equal distance from each other and paste them on to the box to secure them. Make three holes on the side edge of the cardboard box so that the bottlenecks can protrude from them.

Step 3: Take 3 transparent mineral water bottles. Cut the top part off horizontally, so that about $\frac{3}{4}$ of the bottle remains. Make two holes on either side of the cropped mineral water bottles and hang a wire connecting one hole to the other making it look like a bucket. Hang the three mineral water bottles onto the

bottlenecks of the large Pop bottles that are protruding from the cardboard box. The mineral water bottles should hang outside on the bottlenecks.

Step 4: Fill all 3 Pop bottles with equal amounts of Black earth, top soil and clay.

Step 5: Very slowly pour equal amounts of water from the furthest end of the pop bottles into all three bottles.

Step 6: Observe the quantity of soil and the color of the water that drains into the mineral water bottles.

Step 7: Drain off the water and add rocks on to the black earth, mulch on to the top soil and leave the bottle with the clay bare.

Step 8: Very slowly pour equal amounts of water from the furthest end of the pop bottles into all three bottles.

Step 9: Observe once again the quantity of soil and the color of the water that drains into the mineral water bottles.

Observations

1. When the water is being poured into the different bottles with soil, plants, and rocks we will observe the amount of water poured into each cup. The amount of water that is poured into each cup will help us figure out which material helped prevent soil erosion the most.

2. When we poured the water into the black earth soil, Topsoil and Clay soil (it is bare soil) and observed that the black and topsoil eroded easily and the colour of the water was dark brown. These two types of soil had very little difference in the colour of the water. However, the clay had the clearest water because the texture was chunky and glued together so that water did not get absorbed in.

3. Next, we put rocks on the black earth soil, and some mulch on the topsoil to see if it would make a difference when we poured the water in. The black earth had the muddiest water, the topsoil with mulch had a lighter shade of brown while the clay was the clearest out of them all.

4. We observed that when the soil particles don't have much room to absorb water such as in clay soil the water just gushes through but does not carry much soil with it. We also observed that ground coverings such as rocks and mulch can act as a barrier for water to seep through into the soil and will minimize erosion. Certain types of soil can erode more than others depending on some of their textures.

Applications

You can use soil erosion in real life when you are at a beach and you see that the water is taking up more land than it is supposed to so you could use big heavy rocks because they're the ones that stay up the best and the soil didn't go through as much as it did with the artificial grass and the Bare dirt.

Soil erosion is a natural phenomenon and it can happen anywhere. Water, wind and human actions are agents of erosion. When these agents become powerful then, the top part of the soil which carries nutrients can easily get washed off. By understanding different kinds of soil and by applying solid ground coverings we can minimize erosion.

Analysis

In our earlier experiment we used the same type of soil with coverings such as artificial grass and rocks. One bottle contained bare soil with no protection on it. In this experiment we noticed that the bare soil got washed away very easily since it had no protection to keep the soil from getting washed away. The bottle that contained the grass had the clearest water, while the one with the rocks had less muddier water. We observed that grass was the best option for minimizing soil erosion.