

LEARNING ACTIVITY:

Rain and Soil

Grade Level: 5-10

Materials

- Access to a green space or schoolyard garden
- Ring infiltrometers (supplies needed: large metal coffee can or other clean metal can, ruler, marker)
- Water
- Graduated cylinder
- Stopwatch
- Tiller or garden spade



Source: Soil Science Society of America.
Adapted with permission.

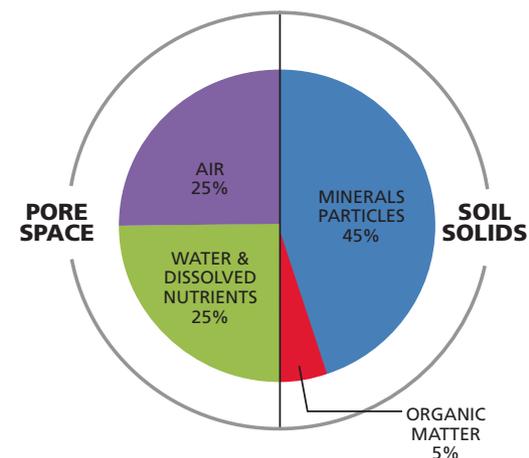
When it rains, much of the water drains directly into the ground. But why?

Soil is made up of four main components: minerals, organic matter, water, and air. Ideal percentages are shown in the figure, but in reality the percentages vary from location to location. Water moves through open spaces in soil known as “pores.” More and larger pores allow water to move freely, whereas fewer and smaller pores restrict water movement. Restricted flow can cause water to pool at the surface, resulting in big muddy patches. It can also cause water to flow over the land surface, leading to erosion.

Compaction of soil can contribute to size and numbers of pores. Soil can become compacted many ways, and this can have long-term effects. For example, when American settlers traveled the Oregon Trail in their wagons in the 1800s, soil became so compacted that we still can see wheel ruts today. Try the following experiment and draw your own conclusions about compaction and pore size in soil.

Procedure

1. Create your own ring infiltrometer using the instructions found at www.soils4teachers.org/esw.
2. Locate two patches of soil or grass near (but not directly next to) each other: one people have walked on quite a bit, and one mostly undisturbed.
3. Sink your infiltrometers about a third of the way into the soil in each patch to the mark you made. (Try to not break up soil or grass much.)
4. At the first patch, fill the infiltrometer with water to your pre-marked line and start the stopwatch. Continue adding water to



Kathy Zurek, University of Minnesota Extension

the line and measuring the amount added as you go. After two minutes, stop the stopwatch and note the time and total volume of water added.

5. Repeat the experiment at the other patch (or run the experiments simultaneously with two teams).
6. Calculate the infiltration rate (equations provided in link in Step 1) by dividing the depth of water that ran through by the time elapsed.

Extension: Repeat the experiment by locating a third area that can be tilled. Till an area of soil uniformly using a tiller or garden spades without destroying medium-sized soil clods. Once the soil has been tilled to a “fluffy” consistency, stomp down on half of the tilled area to compact it.

Discussion

View slides of macropores and micropores (see link in Step 1). Discuss:

1. What factors affect water infiltration, storage, and runoff in soils?
2. How do surface soil aggregation, compaction, and porosity affect infiltration, storage, and runoff?
3. Based on what you’ve learned, what practices would you implement or avoid at your home or school?

SUNDAY

MONDAY

TUESDAY

WEDNESDAY

THURSDAY

FRIDAY

SATURDAY

1

2

3

4

5

6

7

8

9

10

11

12

13

Friendship Day

14

15

16

17

18

19

20

Did You Know?
Hurricane Camille (Category 5)
Strikes Mississippi, Louisiana
and Virginia, 1969

Did You Know?
Florissant Fossil Beds
National Monument,
Renowned for Insect Fossils,
Authorized 1969

21

22

23

24

25

26

27

Did You Know?
Hurricane Andrew
(Category 5) Hits Florida
and Louisiana, 1992

Did You Know?
Hurricane Katrina
(Category 5) Strikes Florida,
Later Louisiana, 2005

Did You Know?
Colonel Edwin Drake Drills
First U.S. Oil Well in Titusville,
Pennsylvania, 1859

28

29

30

31