

Making Mud Shakes To Learn About Soil

*A lesson from the New Jersey Agricultural Society
Learning Through Gardening program*

OBJECTIVES: The student will be able to:

- Name the three types of soil: sand, silt, and clay
- Define silt as the best soil for plants because it can hold just enough water for plants and let in air.

GRADES: K-5

MATERIALS:

Plastic bottle with screw top for each small group of 3-4 students

For each bottle you will need:

one cup of sand (play sand is fine)

one cup of soil from the school garden

one cup of clay (available in most New Jersey backyards)

Funnels made from the tops of the bottles (one for each group). To make a funnel, cut the top off a bottle and turn it over. Use duct tape to tape a funnel to the top of plastic bottle for each small group

Water

Small watering can or empty gallon milk jug for each group to use to hold water

“Types of Soil Experiment” worksheet

PROCEDURE:

Ask students if plants can grow in any type of soil. What type of soil is it difficult for plants to grow in? Explain the three types of soil – sand, silt, and clay.

Sand is the biggest and heaviest type of soil with more space in between particles so that water can run through it easily. Clay is the smallest and lightest type of soil that is packed together so tightly it is difficult for water to run through it. Silt is the “just right” medium-sized type of soil that allows water to move slowly through so plants can catch the water with their roots.

The teacher can demonstrate how water runs through each type of soil by drawing circles on the board – big circles spaced far apart for sand, medium-sized circles spaced closer together for silt, and small circles spaced close together for clay.



Play the Types of Soil Game

This fun, active, and fast game shows students how water moves through the three types of soil. The game can be played indoors or outdoors.

Divide the students into three groups by having them count off by three, reminding them to remember their numbers. Ask the students with the number 1 to line up. Tell them to stretch their arms out at shoulder height and move away from each other until they are in a line with only their fingertips touching. Tell the students that they represent sand particles.

Ask the rest of the class to line up about 8-10 feet in front of these students. Tell the students that each of them are a drop of water. They are to move through the sand by moving underneath the arms of the “sand” students and moving back out again. After the students have moved through and back under the “sand” students’ arms, ask them if it was difficult or easy to do. Water moves very easily through the large particles of sand.

Next, ask the sand students to join the other students in line, and ask the students with the number 2 to line up in front. They are the silt particles. Ask them to put their hands on their hips and make a line with the tips of their elbows touching. Then ask the rest of the students - the water droplets - to move through the “silt” students by again moving under their arms. Once all of the students have moved through the silt and back, ask them if it was more difficult to pass through the silt than the sand. Water moves more slowly through the medium-sized silt particles, allowing the roots of plants to catch and soak up water.

Ask the silt students to join the other students in line, and ask the students with the number 3 to line up in front. They are the clay particles. Ask them to line up with their arms at their sides with their hands in a fist with only their thumbs sticking out. They should line up with the tips of their thumbs touching. Remind the rest of the students that it is difficult for water to move through the very small clay particles and that they must move slowly and carefully. Ask them what happens to water when it cannot run through soil? It forms puddles on the surface. Tell students that if they find they cannot move through the line of “clay” students, they can flop down and lay in front of the clay line, calling out, “I’m a puddle.”

After everyone has either moved through the clay line or become a puddle, ask students about the differences they experienced moving through sand, silt, and clay.

MAKING MUD SHAKES

Tell the students that the soil in the school garden is made up of silt that is good for plants. Say that today we are going to make mud shakes to compare this silt to the other types of soil – sand and clay.

Divide the students into small groups of three to five. Give each group a plastic bottle with a funnel taped to the top. Ask the students to fill the bottle two-thirds full with water. Using the funnel, the students add one cup of clay, one cup of sand, and one cup of garden silt to the bottle. The sand and garden silt will be easy to put into the bottle. The students will have to use a pencil to push the clay through the funnel.

Remove the funnel and the tape and seal the bottle cap on tightly. Give each child in the group a chance to shake the bottle vigorously until the water and all the soil is mixed well. (It defuses arguments to ask each child to take a turn shaking by counting to 10 and then giving someone else a turn.) Ask the students to let the bottles stand in their classroom until the water at the top is fairly clear. This may take several days. Do not move the bottles.

The students should see the three different type of soil settle in layers. The sand will be the heaviest and will be at the bottom. The silt will be in the middle. The clay will be the lightest and will be at the top. Look at the surface of the water. Is there some plant material floating there? How does your garden soil compare to the other soil?

EVALUATION:

Students will be able to list the three types of soil. Students will be able to tell which type of soil is most desirable for plants and why.

Completed “Types of Soil Experiment” worksheet

EXTENSION:

Read and discuss Steve Tomecek's book *Dirt*.

New Jersey Learning Standards

Science: K:LS1.C 1:LS1.A 2:LS2.A 3:LS3.B, LS4.C 4:ESS2.A
 5:LS2.B

NAME _____

Types of Soil Experiment

There are three types of soil. Sand is the largest and heaviest. Silt is medium-sized. Clay is the smallest and lightest.

Describe the contents (what's inside) of one of the soil bottles after it's just been shaken.

Describe the contents of one of the soil bottles the next morning.

Describe the contents of one of the soil bottles after three days. Do you see any layers?

Why do you think the soil settled the way it did?
