STEM in the PARK™

Science, Technology, Engineering, and Mathematics

What Soil Makes the Best Mud Pies?

Background:

Soil refers to natural materials composed of minerals of different grain sizes, organic material, air, and water. The mineral sizes typically fall into one of three groups. **Sand**-sized particles are between 0.05 and 2.0 mm in size, **silt**-sized particles are between 0.002 mm and 0.05 mm in size, and clay-sized particles are less than 0.002 mm in size.

One way we describe soil is by its **texture** which is the way soil feels when it is squeezed between your fingers or in your hand. Sandy soil has a gritty feel when moist and rubbed between your fingers. Silty soils have a floury and smooth feel when moist. Clay soils feel sticky and dense when moist.

Soil is very important because it serves as a medium for plant growth as well as other uses. The use and function of soils depends on the amount of minerals, organics, air, and water present and its texture. For example, a good soil for growing plants has about 45% minerals, 5% organics, 25% air, and 25% water.

But what about making mud pies? Your task in this activity is to determine what soil type is best for making mud pies, and why.

Materials:

1 cup Sand	Water
1 cup Clay	Measuring cup
1 cup Potting soil	3 disposable plates
Marker for labeling plates	Ruler

The **purpose** of this activity is to find out which type of soil makes the best mud pie. Describe 4 characteristics of a good mud pie. Record each characteristic below and in the first row of tables 1 and 2.

1. _____   2. _____

3. _____   4. _____

Predict: Which soil type will make the best mud? Why do you predict this?

Procedure:

set up a fair test.

A fair test is one in which only one variable changes at a time. The investigator manipulates one variable in order to find out what happens to the other variables in the experiment. The controlled, or unchanged, variables are the ones the investigator watches and measures during the experiment. The controlled variables might change in response to what the investigator changed.

1. Label plates: Sand, clay, potting soil.
2. Decide how much soil to use for each type.
    • Amount of soil for each type: _____
3. Decide how much water to use for each soil type.
    • Amount of water for each soil type: _____
4. Mix together measured amount of soil and measured amount of water to make the mud.
5. Form mud pies on plate into a flat disk shape on the labeled plate of the soil type used. Make each mud pie the same size, use a ruler to measure the same height and diameter for each pie.
    • Height _____
    • Diameter _____
6. Describe and record what your wet mud pies look like in table 1.
7. Set mud pies in a sunny area inside, or outside where they won't get rained on, and let dry for 1-2 days.
8. Record what you see once the mud pies are dry in table 2.
9. Measure the height and diameter of the dry mud pies. How do they compare to when they were moist?

Results:

Soil Type	Characteristic 1 _____	Characteristic 2 _____	Characteristic 3 _____	Characteristic 4 _____
Sand **WET**				
Clay **WET**				
Potting Soil **WET**				

Table 1

Soil Type	Characteristic 1 _____	Characteristic 2 _____	Characteristic 3 _____	Characteristic 4 _____
Sand **DRY**				
Clay **DRY**				
Potting Soil **DRY**				

Table 2

Which soil types made the best mud pies? The worst? Why?