



LEARNING ACTIVITY:

# Soil Glue

GRADES 9–12

## MATERIALS

- 2 tall, wide-mouth glasses/ glass jars
- 2 pieces of ¼-in wire mesh (about 10 cm x 15 cm) or 2 two-mm sieves
- 2 soil aggregates (clods) about the size of an egg, of topsoil from areas with different surface conditions (examples of areas to sample are undisturbed lawn/forest/pasture/prairie and disturbed areas such as construction sites, dirt path, garden, farm field)

The health of soils is crucial in reducing soil degradation and supporting the systems of the underground life cycle. In healthy soils, sand, silt and clay particles are held together by “soil glues”, or glomalin, a protein produced by fungi. Glomalin sticks to soil particles and holds them together, much like glue, to form stable aggregates (clods). This ability is called aggregate stability. When a soil is heavily disturbed during construction or cultivation (tillage), the uppermost layer (topsoil), is drastically changed. These changes decrease soil microbial activity which decreases the amount of glomalin produced. Soil aggregates that have not been disturbed for many years will have larger amounts of glomalin, resulting in more stable aggregates because the glomalin holds the soil particles together. This activity will demonstrate how these soil glues help aggregates hold together, especially when very wet.

## PROCEDURE

- 1 Shape the wire mesh into a concave shape to sit about 4 cm below the rim of each glass/jar while resting on top.
- 2 Label each glass with the soil surface condition from which it was collected and fill each glass with water to within about 1 cm of the top.
- 3 Place both soil aggregates into the mesh of their corresponding glass at the same time, ensuring the aggregate is almost fully submerged in the water.
- 4 Observe the results and record observations.



Steps 1 and 2

## ANALYSIS

- 1 How does each aggregate look? How are they the same? How are they different?
  - a. Did the aggregates respond the same way (did the soil stay together or fall apart)?
  - b. How does the water in each glass look? Does it look the same after 1 min, 5 min, etc.?
- 2 If the water became cloudy, did it later become clear again? How long did it take for most of the soil to settle to the bottom? Does any water stay cloudy even after a long time?



Step 3 and 4

Soil aggregate.

Credit: AdobeStock



## FURTHER STEPS

Slaking is a term that describes how soil aggregates fall apart when submerged in water. Conduct a more advanced experiment to determine aggregate stability using the Soil Health Institute’s new app: <https://tinyurl.com/slakes-app>.

Visit [www.soils4teachers.org/esw](http://www.soils4teachers.org/esw) for more activities on soil properties, processes, and health.

## NGSS CONNECTIONS

**SEP:** Obtaining, Evaluating, and

Communicating Information; Asking Questions and Defining Problems

**DCI:** ESS2.A: Earth’s Materials and Systems

**CCC:** Systems and Systems Models; Influence of Science, Engineering, and Technology on Society and the Natural World

## SDG CONNECTIONS

**15:** Life on Land



Source: Soil Science Society of America.

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Activity images credits: Clay Robinson