

LEARNING ACTIVITY:

Climate and Temperature

Grade Level: 5-8

There are many factors that combine to form soil, an important, slowly renewable resource. Some of these factors include climate, organisms, relief, parent material, and time. Soil provides the food, fiber, and building materials to nourish, clothe, and house Earth's inhabitants.

How does climate help soil to form? In warm, moist climates such as those in tropical rainforests, organic (formerly living) material breaks down most quickly. In hot, dry climates, on the other hand, decomposition is slower because there is less water. This slow decomposition creates light soils that contain little organic matter. Grassland soils in temperate climates contain much organic matter.

The amount of plant matter that can decompose to make soil varies among different climates. Few plants grow in deserts, for example, but there are lots of grasses in semiarid regions, and forests flourish in humid regions. This activity demonstrates how soil temperature is affected by water content, plant or mulch cover, and aspect.

Materials

- 8 plant trays, shoe boxes, or disposable foil baking trays (large roaster or 5-lb size pan, about 7 cm deep)
- 8 digital thermometers
- 5 large trash bags
- Local soil
- Grass clippings
- Water
- Graduated cylinder or beaker

- Scale capable of weighing at least 5 kg (optional)
- Metric ruler
- 500 mL graduated cylinder
- Compass
- Paper and pen

Procedure

1. Day 1: Collect enough local soil to fill all trays. Spread the soil in a thin layer on a large trash bag in a sunny spot to dry (about 24 hours).
2. Day 2: Fill all trays with soil to within 6 mm of the top. If a scale is available, weigh the pans to make sure all have the same quantity of soil. Slowly add 700 mL water per tray to four of the soil trays. Cover with trash bags overnight.
3. Day 3: Remove trash bags from wet trays. Place about 6 mm of grass clippings (mulch) on two of the dry soil trays and two of the wet soil trays.
4. Insert a digital thermometer 5 cm deep into the center of each soil tray.
5. With permission, place trays on north and south sides of a building where they will not get wet: On the north side of the building, put one wet, bare tray; one dry, bare tray; one wet, mulched tray; and one dry, mulched tray. Leave about 10 cm between trays. Cover the trays if it rains. Place the remaining four trays on the south side of the building (not in the shade of a tree or other building), again leaving about 10 cm between trays.



6. Hypothesize about the results. Will the soil temperature in each tray be the same? Will the trays on the north and south sides of the building have similar temperatures? What are your reasons for your hypotheses? Record both your hypotheses and your reasons for later.
7. For each tray, record the minimum and maximum daily temperatures for one week. Reset the thermometers every day.
8. Compare your results to your hypotheses. What are the possible reasons for any differences you observed? How might these differences affect plant growth or the location of vegetation (full sun, partial sun, shade, etc.)? For more background on soil temperature, and for an indoor soil temperature activity using heat lamps, see www.wtamu.edu/~crobinson/SoilTemp.

For other great activities that use soil to teach science, visit www.soils.org/lessons.



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