APRIL 2024

LEARNING ACTIVITY:

The Soil Science of Sports Fields

Credit: ©Adobestock

GRADES 5–8

MATERIALS

- Two large plastic cups
- Paper coffee filters
- Drill (or something to poke holes, may require supervision)
- Stopwatch
- Two 0.5-liter pitchers filled with water
- Measuring cup
- Two medium bowls
- Dry playground sand
- Dry soil from your area

Procedure step 2
Credit: Chase Straw

Soil Science Society of America

Source: Soil Science Society of America.

Developed by Chase Straw and Melanie Szulczewski for SSSA.

Soil plays a pivotal role in natural turfgrass sports fields. Native (natural) soils are common on community fields, while engineered (amended) soils are often used on baseball/softball infields and professional fields. Soil types vary in their water holding capacities and infiltration rates. For example, clayey soils have smaller particle sizes with less pore space than sandy soils giving clayey soils a higher water holding capacity. Slower water infiltration through clayey soils could cause game cancellations during heavy rainfalls due to water pooling on the field

A goal for field managers is optimal soil moisture conditions for turfgrass growth while ensuring safety and playability. Soil moisture sensors can measure the relative amount of water in soil to help with irrigation scheduling. In this activity, you will compare the infiltration and water-holding capacities of two soils to determine which would be best to use on a sports field.

PROCEDURE

1. Drill three small holes in the bottom of each plastic cup.
2. Fill one coffee filter with dry sand and one with dry locally sourced soil.
3. Place each coffee filter in the bottom of one of the cups. Add soil until the soil is 1-inch from the top of the cup.
4. Hold each cup just above the bowls.

Procedure step 5
Credit: Chase Straw

5. Have two people pour water at about the same rate from the pitchers into the cups for 3 minutes. Pour slowly so the cups do not overflow. Water should go through the sand and soil and into the bowls.
6. Continue pouring until the water is gone or time is up. Measure the amount of water caught for each soil type.

ANALYSIS

1. Which soil type had the higher water holding capacity? How do you know?
2. In what scenarios would it be desirable for sports fields to have a high water infiltration rate? What about a higher water holding capacity?
3. How would higher water infiltration rates affect sports field management decisions, such as irrigation and fertilization?
4. How would water infiltration rate and water holding capacity affect the growth of crops on a farm? Why might the choices made for a sports field be different from those on a farm?

FURTHER STEPS

If you have access to a baseball field, try this experiment after several days of no rain:

1. Saturate an area of the infield (about a 5 x 5 ft square). Wet the soil just enough to be noticeably different from the dry area.
2. Bounce a baseball on both the wet soil and the dry soil, then walk on each area. Were there any differences in ball bounce on the wet versus dry soil? Did they feel different when walking on them? Which would you prefer running on and why? What are possible implications of an infield soil being very wet or dry during a game (in terms of ball roll and bounce)?

ADDITIONAL RESOURCES

- Sports Field Root Zone Constructions: **https://bit.ly/Rootzones**
- Video of baseball infield construction and maintenance: **https://bit.ly/Baseball_Infield**
- IYS June Video "Soils Support Recreation": **https://bit.ly/Soil_Support**
- Water Movement in Soils video: **https://bit.ly/Water_In_Soil**
- Additional soil lessons: **www.soils4teachers.org/esw**

NGSS CONNECTIONS

SEP: Asking Questions and Defining Problems
DCI: ESS2.A: Earth's Materials and Systems
CCC: Systems and Systems Models

SDG CONNECTIONS

11: Sustainable Cities and Communities
15: Life on Land