Soil Infiltration

Background

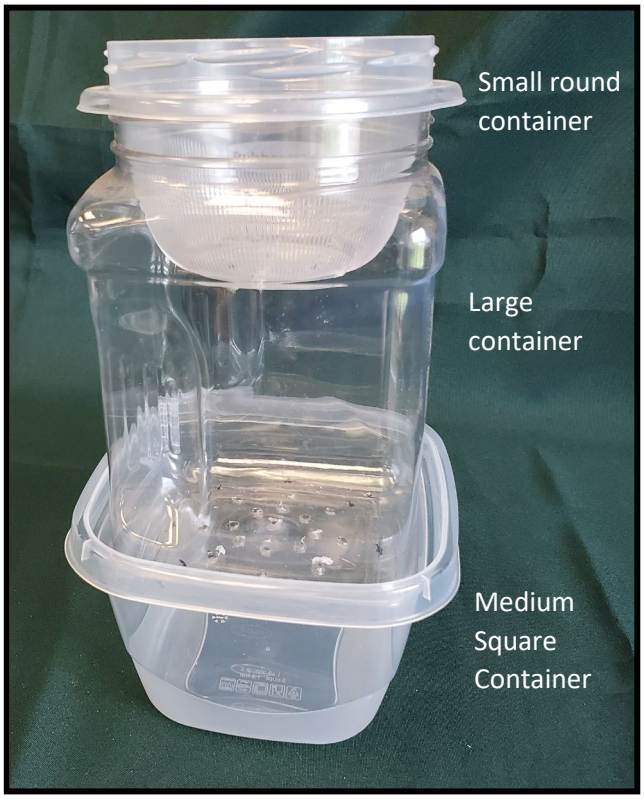
- What is soil infiltration?
  - **Soil infiltration** is the movement of water into and through the soil
  - It allows the soil to temporarily store water, making it available for uptake by plants and soil organisms.
- What is an infiltration rate?
  - The infiltration rate is how quickly water moves into the soil.
- What are the effects of poor infiltration rates?
  - Water entering too slowly may lead to ponding on level fields, erosion from surface runoff on sloping fields, or inadequate moisture for crop production.
  - Slow or no infiltration causes surface runoff
  - An infiltration rate that is too high can lead to nitrate-nitrogen or pesticide leaching, if they are not managed correctly.
  - An adequate amount of water must infiltrate the soil profile for optimum yield. Porous soils allow water to infiltrate and recharge ground-water aquifers and sustain base flow in streams.
- What affects soil infiltration?
  - Soil texture is number one in affecting soil infiltration
    - Inherent factors affecting soil infiltration, such as soil texture, cannot be changed. Soil texture (percentage of sand, silt, and clay) is the major inherent factor affecting infiltration.
    - Water moves more quickly through large pores of sandy soil than it does through small pores of clayey soil, especially if clay is compacted and has little or no structure or aggregation.
  - Management practices impact soil infiltration
    - Management practices (such as providing ground cover and managing equipment traffic to avoid compaction) impact infiltration by affecting surface crusting, compaction, and soil organic matter.
    - Without a protective vegetative or residue cover, bare soil is subject to direct impact and erosive forces of raindrops that dislodge soil particles. Dislodged soil particles fill in and block surface pores, contributing to the development of surface crusts which restrict water movement into the soil.
    - Compaction can result from equipment traffic, especially on wet soils, and tillage pans. Compacted or impervious soil layers have less pore space and restrict water movement through the soil profile.
  - Soil moisture levels also impact infiltration
    - As soil moisture levels increase, infiltration rates decrease. Soil moisture is impacted by water uptake by plants, residue and vegetative cover, irrigation practices, and drainage measures.
    - Dry soils tend to have pores and cracks that allow water to enter faster than wet soils. As soils become wet, infiltration rate slows to a steady rate based on how fast water can move through the most restrictive layer, such as a compacted layer, or a layer of dense clay.

Supplies

- 2 sets of plastic containers (small round, medium square, and large)
- Two soil samples (students could bring their own; it is best to have soils of the same texture for experiments, but different textures will work for demonstrations)
- Water

Directions

1. Place one cup of soil in large container
    - If it already has soil in it, you can wet it down to get rid of cracks
    - Be sure to pack the edges to avoid preferential flow on both old and new samples
2. Nestle the large container into medium square
3. Place small round container on top of the large one.
4. Repeat steps 1-3 for the other soil sample
5. Pour one cup of water into top container
6. Observe what happens during rainfall simulation
7. Once soil is saturated you may empty the bottom container repeat steps 5 and 6
8. Have students fill out the *Soil Infiltration Worksheet*
9. When you are finished you can place the lids back on the large containers and leave them nestled into the medium container.



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Soil Infiltration Worksheet

1. Does the water infiltrate into the soil? Does it pool on top? Why could this be?

2. Is the water in the bottom container clear or cloudy? Why?

3. Is the water on top of the soil clear or cloudy? Why?

4. Imagine if this was a field, how would the water move across the land? Where would the water end up? What would be the effects of this movement?

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