Single Ring Infiltration Instructions for South Dakota

Materials needed to measure infiltration:

- 6-inch diameter ring, 5.25 inches in length
- Plastic wrap
- 500 mL plastic bottle or graduated cylinder
- Block of wood
- Hand sledge hammer
- Water
- Stopwatch or timer

Background

Infiltration rates change throughout the year with changes in soil temperature and moisture which effects biological activities, as well as other physical characteristics, such as shrink swell. Timing of sampling needs to correspond with periods of adequate soil moisture and active plant growth. For cool season plant communities, this time frame should be during the months of April, May, and June. For warm season plant communities, sampling should occur in May, June, and the first half of July. In annually planted cropland sampling should be done only after the crop is established and actively growing. If the soil is saturated, infiltration will not occur. Wait for one or two days to allow for some drying to occur.

1. Drive Ring Into Soil

    - The infiltration test should mimic field conditions as close as possible. Uniform residue or surface litter that represents the field should be left intact. Clear the sampling area of large pieces surface residue, etc. If the residue is wet and hair-pins when the ring is driven, remove and replace the residue. If the site is covered with vegetation, trim it as close to the soil surface as possible.

Figure 3.1

    - Using the hand sledge and block of wood, drive the 6- inch diameter ring, beveled edge down, to a depth of 31/4 inches (two inches remaining above ground) Figure 3.1.

    - If the soil contains rock fragments, and the ring cannot be inserted to depth, gently push the ring into the soil until it hits a rock fragment. Measure the height from the soil surface to the top of the ring in centimeters (cm). [See note below]

2. Firm Soil

    - With the 6-inch diameter ring in place, use your finger to gently firm the soil surface only around the inside edges of the ring to prevent extra seepage. Minimize disturbance to the rest of the soil surface inside the ring.

3. Line Ring With Plastic Wrap

    - Line the soil surface inside the ring with a sheet of plastic wrap to completely cover the soil and ring as shown in Figure 3.2. This procedure prevents disturbance to the soil surface when adding water.

Figure 3.2

4. Add Water

   - Fill the plastic bottle or graduated cylinder to the 444 mL mark with the water.
   - Pour the 444 mL of water (1" of water) into the ring lined with plastic wrap as shown in Figure 3.2.

Figure 3.3

5. Remove Wrap and Record Time

   - Remove the plastic wrap by gently pulling it out, leaving the water in the ring (Figure 3.3). Note the time or start the stopwatch.
   - Record the amount of time (in minutes/seconds) it takes for the 1 inch of water to infiltrate the soil. Stop timing when the surface is just glistening.
   - If the soil surface is uneven inside the ring, count the time until half of the surface is exposed and just glistening (Figure 3.4).

Figure 3.4

6. Repeat Infiltration Test

   - In the same ring, perform steps 2, 3, and 4 with a second inch of water. Record the number of minutes/seconds in the elapsed time for the second infiltration measurement.

Considerations:

Soil Moisture – The moisture content of the soil will affect the rate of infiltration; therefore, two infiltration tests are usually performed (if soil is dry). The first inch of water wets the soil, and the second inch gives a better estimate of the infiltration rate of the soil. Ideally, the second inch of water is applied to allow sufficient time for the water to thoroughly permeate into the soil. (If soil moisture is at or near field capacity, the second inch test is not necessary.) Under normal testing conditions the rings maybe left overnight and the second inch applied the next day. However, this may not be possible in every situation, so attempt to allow as much time as possible between the first and second inches (At a minimum 1-6 hours before applying the second inch).

Site – Avoid odd areas of the sampling area such as areas of compaction or other non-typical soil related issues. End rows, cattle paths, lot or loading areas should be avoided.

Replication – Sampling individual sites for benchmark values should be replicated at a minimum of 3 times. If the infiltration rates vary more than 25% additional samples should be taken until at least 3 rates fall within 25% of each other.

For Interpreting Infiltration Results – Go to:

http://www.nrcs.usda.gov/wps/portal/nrcs/main/sd/soils/health/

(Click on the "dig a little – LEARN A LOT" icon)

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Moist Color