



How to measure soil infiltration rate

fact sheet

What is soil infiltration rate?

Soil infiltration rate is a measure of how fast water enters the soil. It is expressed as water depth per time (i.e., centimeters per hour). Infiltration rate is affected by soil texture (e.g., faster in sandy soils), soil moisture (e.g., faster in drier soils), soil structure (e.g., faster in soils with smaller, stable aggregates), organic matter (e.g., faster in soils with higher organic matter), soil crusts (e.g., faster without crusts), and compaction (e.g., faster without compaction).

Why is measuring soil infiltration rate important?

Knowing soil infiltration rates can help improve irrigation management so that the appropriate amount of water is applied given soil conditions. If water is applied faster than soil infiltration, water will stay on the soil surface or, if sloped, run off the field and cause erosion. If water stands too long, plant roots will begin to die due to lack of oxygen.

How to measure soil infiltration rate?

A simple method to measure soil infiltration rate requires the following materials:

- Large coffee can with bottom removed
- Wood block and hammer
- Shovel
- Ruler or tape measure
- Watch
- Notebook and pen

Steps:

1. Clean a level surface of soil without disturbing it.
2. Drive the can about 5 cm into the soil using a wood block and hammer.
3. Gently press the soil around the edges of the can to prevent leaks.
4. Mark the inside of the can about 10 cm above the ground to identify the "fill-line", and then mark another line 1 cm below the "fill-line".
5. Pour water into the can up to the "fill-line". Pour the water gently along the sides of the can so the soil is not disturbed.
6. As soon as the water level reaches the "fill-line", stop filling the can and start the timer.
7. Record the time it takes the water level to reach the other line 1 cm below the "fill-line".
8. After recording the time, refill the can up to the "fill-line" and take another reading.
9. Take a minimum of eight readings or until the reading times change very little.
10. Calculate infiltration rate by averaging the final readings and converting the units to centimeters per hour.

Table 1. Interpretation of results.

Infiltration Rate (cm per hour)	Class
> 2 cm	Excessive infiltration (Suitable for drought-tolerant crops)
0.5 to 2 cm	Good infiltration (Suitable for most crops)
< 0.5 cm	Poor infiltration (Suitable for plants that tolerate wet soil)

How to increase soil infiltration?

- Reduce tillage to avoid compaction and pulverizing the soil
- Use machinery when soils are not wet
- Break up compacted layers with deep tillage or ripping
- Decrease crust formations by maintaining some crop residue on soil surface
- Use a row cultivator or similar device to break up soil crust
- Increase soil structure and stability by increasing the amount of organic matter added to the soil



Figure 1. Infiltration rate test using a small can or container (Source: USDA).

For more information visit: eafghanag.ucdavis.edu

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Reference: Soil Infiltration, NRCS

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