



# How to measure soil drainage

## What is soil drainage?

Soil drainage is the removal of water from below the soil surface

## Why is soil drainage important?

Too much drainage can cause plant water stress and loss of nutrients; poor drainage can lead to suffocated roots, which become diseased and eventually die. Other plant symptoms of poor drainage include: yellowing of leaves, leaf loss, leaf scorch, and death of shoots (dieback). Blue-gray or gray-mottled soil colors can also be signs of poor drainage (Fig. 1)

## Soil factors that reduce drainage:

Heavy clay soil texture, soil compaction, shallow bedrock, high water table

## Measure soil drainage: Percolation test

1. Dig a hole 18 to 24 inches (45 to 60 cm) deep; hole width: > 6 inches (15 cm). Do this in a couple of spots to get a better idea of the drainage within an area
2. Fill the holes with water and let drain; leave overnight if necessary
3. Refill holes with water to within a couple inches of the top
4. Measure the drop in water level over time. Lay a stick across the top of the hole to use as a reference. Use a tape measure (or something similar) and measure from the top of the water to the bottom of the reference stick
5. Measure the drop in water level every 10 to 30 minutes (depending on how fast the water drains) and record the data
6. Use the data to calculate average drop in water level per hour



Fig 1. Soil profile with a blue-gray colored layer indicting poor drainage

Drainage Rate (inches per hour)	Class
> 6 (15 cm)	Too much drainage (Suitable for drought-tolerant crops)
1 to 6 (2.5 to 15 cm)	Good drainage (Suitable for most crops)
< 1 (2.5 cm)	Poor drainage (Suitable for plant that like wet ground)

## How to manage soils that drain too slow or too fast?

### If soil drains too slow:

- Grow plants that like wet soils
- Add organic matter to improve soil structure
- Plant in rows of raised beds with furrows, or mini-channels, running between the rows to remove excess water
- Add subsurface drainage tiles that will carry away excess water from field

### If soil drains too fast:

- Choose plants that grow well in dry soils
- Add organic matter will improve the water holding capacity of the soil
- Mulch to reduce evaporation loss
- Plant in bottom of furrows to channel rain or irrigation water to plants

For more information visit: [afghanag.ucdavis.edu](http://afghanag.ucdavis.edu)

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Reference: How to Run a Percolation Test, UM extension; Soil Test Kit, NRCS

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