

Jul 12, 2024

## Water holding capacity by mass loss

This protocol is a draft, published without a DOI.

Jennifer Moore<sup>1</sup>

<sup>1</sup>USDA-ARS



Jennifer Moore

USDA-ARS

---

OPEN  ACCESS



**Protocol Citation:** Jennifer Moore 2024. Water holding capacity by mass loss. [protocols.io](https://protocols.io/view/water-holding-capacity-by-mass-loss-dgmc3u2w) <https://protocols.io/view/water-holding-capacity-by-mass-loss-dgmc3u2w>

**License:** This is an open access protocol distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited

**Protocol status:** In development

**We are still developing and optimizing this protocol**

**Created:** July 03, 2024

**Last Modified:** July 12, 2024

**Protocol Integer ID:** 102788

### Abstract

Modified protocol based on that published by Nelson et al., 2024, 55(8):1190-1204.

### Materials

Whatman #1 filter paper

DI water

Funnels to hold filter paper

Beaker or rack to hold filter paper (do not need to collect water)

Drying oven

Balance capable of weighing to 0.000g

Trays to hold filter paper (that can withstand heat of oven!)



## Set-up

1. Fold a Whatman #1 filter paper into quadrants to make a cone shape.
2. Place into a conical funnel.
3. Pre-saturate filter with DI water by dispensing water around the edges of the filter paper and allow excess to pass through.

## Wetting up soil

1. Add 8.0g +/- 0.05g of air-dried soil to the wet filter paper. Use top-loading balance. You do not need to record the weight.
2. Saturate soil by **wetting the outer rim** of the exposed filter paper so as not to disrupt the soil or cause crusting. A squirt bottle with a narrow tip works best.
3. After the soil glistens or a small amount of water forms at the surface, stop adding water.
4. Include one blank filter paper without soil and wet as a control to account for any evaporation (see equation below for more details).
5. Cover funnels loosely with saran wrap (that you will use for weighing the wet filter paper) to minimize evaporation.
6. Record time of saturation. Note: CTRL + SHIFT + semi-colon, is the short-cut to add the time in excel.
7. Allow soils to drain for 6h.
8. While samples are draining, weigh empty tins and record the tin id # and the mass to 0.000g.

## Weighing and Drying

1. Weigh soil plus wet filter paper and record mass to 0.000g. Also, record the mass of the wet, but drained filter (BF0).
2. Place soil and wet filter paper into an oven set to 105C and allow to dry overnight.
3. After drying, cool tins for a minimum of 20 minutes.
4. After cooling, weigh dry soil plus filter paper and record mass to 0.000g. Also, record the mass of the dried filter (BF0)

## Calculation

- 4
$$MWHC = [SF6 + (BF0 - BF6)] - SF_{dry} / SF_{dry}$$

SF6 = mass in g of saturated and drained soil plus filter paper after 6 h drainage  
BF0 and BF6 = mass of dry filter and "Blank" filter with no soil but saturated after 6h to account for any water lost via evaporation.  
SFdry = mass of oven-dry soil plus oven-dry filter paper in g.



## Protocol references

**A Simple, Affordable, Do-It-Yourself Method for Measuring Soil Maximum Water Holding Capacity**  
**([tandfonline.com](https://tandfonline.com))**