

Apr 29, 2025

## Determination of Water Holding Capacity (WHC) of Soil Samples

DOI

<https://dx.doi.org/10.17504/protocols.io.14egnjxbyv5d/v1>

Thomas Muratore<sup>1</sup>, Melissa Knorr<sup>2</sup>

<sup>1</sup>Dartmouth College; <sup>2</sup>University of New Hampshire

Tumber-Dávila Lab

Tech. support email: [grady.welsh@dartmouth.edu](mailto:grady.welsh@dartmouth.edu)



Thomas Muratore

Dartmouth College

### Create & collaborate more with a free account

Edit and publish protocols, collaborate in communities, share insights through comments, and track progress with run records.

[Create free account](#)

OPEN  ACCESS



DOI: <https://dx.doi.org/10.17504/protocols.io.14egnjxbyv5d/v1>

**Protocol Citation:** Thomas Muratore, Melissa Knorr 2025. Determination of Water Holding Capacity (WHC) of Soil Samples. [protocols.io](https://dx.doi.org/10.17504/protocols.io.14egnjxbyv5d/v1) <https://dx.doi.org/10.17504/protocols.io.14egnjxbyv5d/v1>

**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:** Working

**We use this protocol and it's working**

**Created:** April 29, 2025

**Last Modified:** April 29, 2025

**Protocol Integer ID:** 194127

**Keywords:** water holding capacity, soil sample, consistent moisture level, soil incubation, soil samples the aim, essential for reliable microbial activity measurement, soil, microbial processes during incubation study, moisture condition, maximum amount of water, reliable microbial activity measurement, understanding whc, sustaining microbial process, critical for laboratory experiment, laboratory experiment, whc, laboratory, incubation study, water, full saturation, experiment

## Abstract

The aim of this protocol is to determine the water holding capacity (WHC) of soil samples. WHC refers to the maximum amount of water a soil can retain against gravitational forces after reaching full saturation. Understanding WHC is critical for laboratory experiments, particularly soil incubations, where maintaining a consistent moisture level is essential for reliable microbial activity measurements. This method is commonly used to determine 60% WHC, a moisture condition considered optimal for sustaining microbial processes during incubation studies.

## Materials

Drying oven set to 30°C, Funnels (one per sample), Whatman No. 40 filter papers (one per sample), Graduated cylinders (one per sample), Beakers (one per sample), Parafilm, Deionized (DI) water, Balance (for weighing soil), Spatula or scoop for handling soil, Timer or clock, Laboratory notebook or data sheet for recording measurements

## Troubleshooting



## Sample Preparation

- 1 Dry soil samples overnight at 30°C.
- 2 Sub-sample dried soils to obtain a representative portion of each sample.

## Weighing

- 3 Weigh out 25 g of dried soil for each sample using a balance.

## Filtration Setup

- 4 Line each funnel with a Whatman No. 40 filter paper.
- 5 Place each funnel into a graduated cylinder.

## Initial Wetting

- 6 Slowly add 50 mL of DI water evenly across the surface of the soil sample in the funnel.
- 7 Allow the sample to stand for several hours so that water can percolate through.

## Re-wetting

- 8 Carefully collect the water that percolated through the soil into a beaker.
- 9 Reapply this percolated water back onto the soil surface, again dripping evenly.



## Sealing

- 10 Cover the top of the funnel and sample with parafilm.
- 11 Poke a small hole in the center of the parafilm to allow slow drainage.

## Overnight Drainage

- 12 Leave the setup to drain overnight at room temperature.

## Measurement

- 13 The next morning, measure and record the volume (mL) of water that has percolated through into the graduated cylinder.

## Calculation

- 14 Calculate the water holding capacity (WHC) using the volume of water retained by the soil (based on the initial 50 mL added minus the volume collected).

15

$$\text{WHC (\%)} = (\text{Volume of water retained by soil (v1-v2)} / \text{weight of soil}) * 100\%$$

Note: Can determine 60% WHC for an incubation moisture manipulation set-up by \*0.6

16

	A	B	C	D	E	F
	Sample	Wt of soil sample (g)	Vol of water added (ml)– V1	Vol of water collected (ml) – V2	V1-V2 (ml)	WHC %
	BW-1-m	25.02	50	30	20	79.9

