

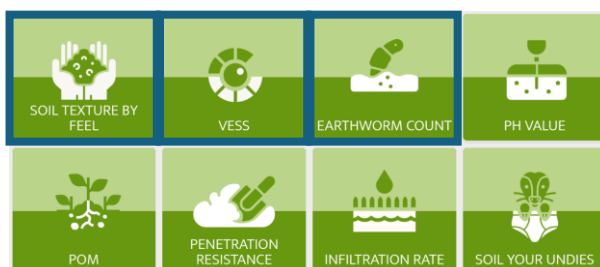


Getting to know your soil

Once your garment is buried, we would like you to perform a few simple soil tests to learn more about your soil. For recording the data of the soil tests, we use the Beweisstück Unterhose App. Here, you will find step-by-step instructions on how to perform the soil tests.

- **Timing:** Perform the tests after you buried your garments. Note that it is best to perform the soil tests in the Fall or in Spring, when it is neither too hot, nor too cold and the soil is not too wet, nor too dry.
- **Select the location:** The location where you perform the tests should be very close (at most 1m away) to the location where you bury your textile. Soil conditions can vary a lot within a few meters.
One test location is sufficient. If you would like to obtain a more representative picture of the soil, you can repeat the tests at up to three locations in total in the vicinity of the buried garment. You can create new spots for the additional locations in the app.
- **Open your spot.** In the app, go to the spot you created to enter the information about your garments (see Document “Instructions for participants”. Click on the spot on the map, click on the three dots  and select «Edit Spot». You can also find all your spots in your profile (profile picture, top right corner) and then clicking on the  symbol.
- **Select the soil tests you want to perform.** The more soil tests you perform, the better the idea we can get about your soil. We recommend, as a very minimum to perform the “**Soil texture by feel**” test. This will tell us something about the basic composition of your soil (amounts of sand, silt and clay in your soil). If you have some more time, please also perform the “**VESS**” test and “**Earthworm count**”. VESS (visual examination of soil structure) will tell us about how well your soil is aggregated and structured (e.g.: Is it compacted or not? Is it likely to be biologically active? Can plant roots grow well in it?). The earthworm count will give us information on how biologically active your soil is. You can do all three soil tests on the same hole/ block of soil.

After opening your spot, scroll down to the question: *Which soil tests(s) do you want to perform?*





Click on all the tests you want to perform. For Soil Bodies, please select Soil Texture by Feel and, if you have time, VESS and Earthworm Count. The other soil tests shown in the app are not required for this project. Below we present exact instructions on how to perform these tests. Follow them step-by-step and enter the results in the respective fields in the app. If you prefer not to use the App when digging in the soil, you can also write down the results in the respective fields provided in the instructions and enter the information in the app later.

Sidenote: The  icon in the app is currently not functional.

Performing all three soil tests (recommended)

What you will need:

- A digging spade (if you don't have one, use a shovel)
- water (best in a spray bottle, can also be another container)
- a tarp (can be a trash bag, cut-open on the sides)
- bucket or jar
- measuring tape



Time needed:

For all three tests: around 45 minutes (Soil texture: 10 minutes, VESS 25 minutes, Earthworm counts: 10 minutes)

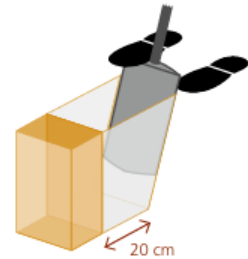
The three tests are designed to be performed using the same soil pit. First collect soil for the texture test, then remove the intact soil block for the VESS assessment. Finally, use this same soil block for the earthworm count.



SOIL TEST 1: SOIL TEXTURE BY FEEL

Step-by-step instruction:

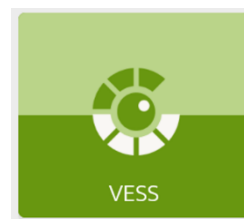
1. Dig a hole of approximately one spade blade's depth (around 30 cm) and 20 cm width on each side. It should be slightly wider than the spade. Try to keep one side of the hole as intact as possible to use it for the VESS spade test (Soil test 2).
2. Take small soil samples from several points between 5 and 20 cm depth. Avoid the organic surface layer and visible plant material.
3. Put the soil in your bucket or jar and mix it thoroughly.
4. For the test, the soil should be moldable, like putty. If your soil feels dry, add a little water and knead it thoroughly to form a homogeneous mass. Take care, the soil is not getting too wet.
5. Perform the soil texture analysis as described in the Soil texture diagram below.
Some notes for explanation: "Gritty" feels like (parts) of sandpaper/ can feel individual kernels, "smooth" feels like wet flour or baby-powder.
6. Select the appropriate soil texture in the App.



Video tutorial: <https://www.youtube.com/watch?v=W0osjN0t-Ho>



Soil Test 2: VESS (Visual Evaluation of Soil Structure)



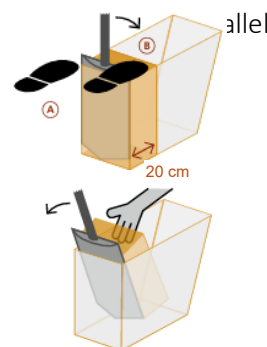
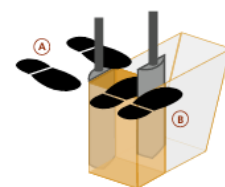
Purpose: This test can tell, how well your soil is aggregated and structured. Soil structure and aggregation are very important for soil functions and soil health. They affect how well plants can grow roots, how well water can enter and be stored in your soil, how resistant it is to erosion. They also tell something about how biologically active your soil probably is.

This video provides a good overview of the process: <https://www.youtube.com/watch?v=y5x6Er-L-3E>

You can find the VESS scoring sheet at the end of this document and for download [here](#).

Step-by-step instruction:

1. Excavate an intact block of soil from the intact edge of the hole as follows: Insert the spade vertically on either side of the block to be excavated (one side being the left intact edge from test 1). If the soil is sticky or heavily covered, stabilize the soil surface with your feet when pulling out the spade.
2. Then insert the spade vertically into the soil at a distance of approx. 20 cm to the left-intact edge. Separate the soil block from the remaining soil volume by pushing the spade slightly forward with your shoulder.
3. Use the spade like a lever and carefully lift the sample out of the hole. Stabilize the block with your hand and place it on a plastic tarp (or cut-open trash bag).
4. Open the block in the middle and push both sides by hand like opening a book to reveal undisturbed areas.
5. In the App, under the section "VESS", enter the soil texture that you determined in Soil test 1 and answer the question about how the soil surface looks. Also note if there is anything particular that you notice with your soil, like foul smell, many stones, etc., in the respective app-section.
6. Place a meter rule next to the block with the 0 aligning with the soil surface and take a photo as shown in the picture:
7. Distinguish soil layers by watching out for changes in color, soil type, structure, etc. Use your hands to separate the layers into their natural components (the aggregates, see explanation and example images) and note whether you need a lot or a little force to do so. The app will guide you





step-by-step through the description of the layers. Beware, in case you have a clayey or sandy soil (see results from Soil test 1), the possible answers change. In the app, this happens automatically.

8. Use the descriptions and photographs in the VESS scoring chart at the end of this document to assign a score from 1 (best structure) to 5 (poorest structure) to each soil layer. Do not worry if your soil does not match an example exactly; choose the description that most closely matches what you observe. Enter the VESS score for each soil layer in the app. You can find more detailed explanations and example pictures [here](#).

Soil Test 3: Earthworm Count

Purpose: Earthworms are important soil organisms with a strong influence on soil structure, plant growth and nutrient availability, biological activity and soil health. Earthworm numbers provide information about soil biological activity and habitat conditions.



Step-by-step instruction:

1. Use the excavated soil volume of the VESS spade test (Test 2) (20 × 20 × 30 cm) that you placed on a tarp or cut-open trash bag.
 2. Carefully separate the soil, break up aggregates and count all earthworms. It is important to break up all soil aggregates as earthworms can hide inside them.
 3. Record the total number of earthworms you found.
 4. Note additional observations such as burrows or feces. Find example pictures [here](#).
 5. Enter the number of Earthworms in the app. If you have special observations, include them as well.
 6. After counting, return the earthworms and soil to the hole.
- **Saving the Information.** Once everything is filled in, click on  **SAVE** and the spot and the data will be saved. If you want to finish your entry later, click on  to temporarily save your data. You can later click on the menu symbol  and select “waiting spots” and finalize entering the information.
 - **Change an entry:** If you want to change an entry, simply click on the spot on the map, click on the three dots  and select «Edit Spot». You can also find all you spots in your profile (top right corner- see above) and then clicking on the  symbol.



VESS Scoring Sheet

VESS ₂₀₂₀ Version 09.06.2020	Layer appearance Aggregate/clod size	Appearance of intact aggregate/clod		Resistance [observe only in optimal moisture conditions, if not optimal refer to appearance after opening]	Opening (breaking) the clod	Appearance of opened aggregate/fragment size and shape		Appearance after "opening"		Roots and color [root observation only possible on established crop]
		Size	Shape					Shape	Porosity	
Sq1 Very good (friable)		Mostly < 6 mm. [not relevant if recent tillage --> refer to shape instead]	Crumbly. Small rounded aggregates	readily crumble with fingers	porous clod: The whole clod can be colonized by roots. When "opening" the clod, it does not break exactly where you want and for Sq1-2 seems to be composed of smaller aggregates.			Large aggregates are composed of smaller ones, held by roots.	High intra-aggregate porosity	Roots within aggregates
Sq2 Good (intact)		From 2 mm to 7 cm [not relevant if recent tillage --> refer to shape instead]	Rounded aggregates. No clods present.	aggregates easy to break with one hand				Opening reveals some smaller aggregates and faces with rough structure	High intra-aggregate porosity	Roots within aggregates
Sq3 Moderate (firm)		From 2 mm to 10 cm. Less than 30% are < 1 cm.	Mixture of various sizes of rounded aggregates. Possibility of some angular non-porous clods	most aggregates break with one hand	non-porous clod, massive structure: roots cannot grow freely, they are restricted. When "opening" the clod, it breaks exactly where you want or along cracks and reveals flat faces.			Opening reveals faces which are more or less rough. Possibly some areas with flat faces	Low intra-aggregate porosity. Some macropores and cracks may be present.	Few roots but mostly within aggregates.
Sq4 Poor (compact)		Mostly large > 10 cm. Less than 30% are < 7 cm.	Sub-angular clods. With possible sharp edges. Horizontal/platey structures or cracks also possible.	requires considerable effort to break clods with one hand				Opening a clod reveals flat faces rather flat faces.	Very low intra-aggregate porosity. Distinct macropores	Roots usually clustered in macropores and cracks. Or around non-porous clods
Sq5 Very poor (Very compact)		Mostly large > 10 cm.	Angular clods. Sharp-edged and non-porous.	difficult to break up				Opening a clod reveals flat angular faces. Possible to make sharp edged cubes	No intra-aggregate porosity. If some pores present, then restricted to a few macropores	Anaerobic zones with grey-blue color possible. Few roots, if present restricted to cracks

