

Is your soil water smart?

Background

Soil is our number one ally for controlling both flooding and drought in our outdoor spaces. Ideally, the soil should act like a sponge, so that it is able to both absorb and retain water but also allow some drainage so that it doesn't flood.

Aim

We want you to take some simple measurements in your outdoor space to see how well the water can penetrate the surface of your soil. This is known as 'infiltration rate'. This will help us to evaluate the challenges that some people are facing with their soils.

How to measure it.

It is possible to make some simple measurements of your soil to see how well the water can infiltrate the surface. It is important that water is able to do this, otherwise it is likely to run off the surface taking nutrients with it.

The principle is simple. A cylinder is inserted into the soil, then a standard depth of 25 mm water is poured in and the amount of time taken for it to drain is measured. This amount of water is chosen as it represents a significant dose of rain.

You will need:

- Drainpipe
- Block of wood
- Mallet or hammer
- Jug of water
- Ruler or measuring tape
- Timer / mobile phone



Instructions

1. Prepare your cylinder, as a cut off length of 10 cm (approx.) drainpipe. The exact diameter is not important.
2. Select your sample site and remove any debris from the surface. If there has been very heavy rainfall recently, wait for a day for it to dry out, so the soil is not saturated.
3. Wet the soil lightly.
4. Insert the cylinder into the soil to a depth of 7.5 cm



5. Firm the soil around the edges of the cylinder
6. Fill the cylinder up to a depth of 2.5 cm (25mm) above the soil surface and start the timer.
7. When all the water is drained out, but the soil surface is still glistening, stop the timer and make a note of the reading.
8. If the water is draining very slowly, you may want to come back to it later. An estimate of the time is fine, we are just trying to see what ballpark your soil falls into!



You can then calculate your infiltration rate which tells you how well your soil can penetrate the surface of your soil.

Infiltration rate (mm / hour) = $25 \div$ Time for water to drain in hours

What do my values mean?

- Greater than 20 mm / hour = high rate, very little risk of flooding
- 5 - 20 = moderate, some risk of flooding
- Less 5 mm = at risk of flooding in heavy rain.

Suggestions:

Try measuring the infiltration rate in various parts of your garden, making a note of the soil conditions where you are measuring and any other features.

What does 25 mm (1 inch) of rain look like in practice?

25 mm of rain:

- is equivalent to around 24 hours of steady drizzle
- is equivalent to an hour's heavy downpour
- is enough to soak the topsoil and give your plants a good drink, but won't reach deep soil

Recording sheet – make copies as necessary

Please submit your readings here –

<https://www.cognitoforms.com/GardenOrganic1/WaterSmartInfiltrationExperiment>

Description of area

Soil type
<input type="checkbox"/> Very sandy <input type="checkbox"/> Quite sandy <input type="checkbox"/> Silty <input type="checkbox"/> Mix of sand, silt and clay (loam) <input type="checkbox"/> Some clay <input type="checkbox"/> Heavy clay <input type="checkbox"/> Peaty <input type="checkbox"/> Chalky

Sandy soils are very gritty and dry out quickly

Clay soils feel sticky and remain wet

Silty soils have a smooth 'soapy' feel

Your soil may be a mixture of these types

Soil condition
<input type="checkbox"/> Very hard <input type="checkbox"/> Quite hard <input type="checkbox"/> Moderately firm <input type="checkbox"/> Soft

Infiltration rate		
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">Estimated time taken for 25 mm to drain (hours)</td> <td style="width: 50%; border: none;">Calculated Infiltration Rate (25 ÷ Time for water to drain in hours)</td> </tr> </table>	Estimated time taken for 25 mm to drain (hours)	Calculated Infiltration Rate (25 ÷ Time for water to drain in hours)
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Any other notes

Some thoughts about why my soil behaves in this way

For the soil to absorb water well, we need the soil particles to stick together gently as crumbs so that it retains an open structure of pores of different sizes. We want it to be like breadcrumbs but not like shortcrust pastry!

Lots of factors contribute to this such as:

- ◆ Is the soil made up of fine sticky clay particles that are more likely to clump together like a brick, or is it made up of freer-draining coarse sand particles?
- ◆ Does the soil have plenty of organic matter such as compost or leafy material that help it to retain its crumb structure?
- ◆ Is there plenty of biological life in the soil that help dig lots of channels of different sizes?
- ◆ Is the soil left bare for long periods of time, exposing it to heavy rain and sunlight?
- ◆ Is the soil dug too often, potentially damaging the structure and disrupting biological life?

How can I improve my soil?

- ◆ The number one improvement is to add sources of organic matter such as garden compost or leaf mould. This will act like a sponge, help the soil particles form a crumb structure and also feed the biological life which also help to look after the structure of the soil
- ◆ Reducing digging or going for no dig methods will also help to preserve the soil structure and biology of the soil
- ◆ Avoiding bare soil over winter by growing a green manure or covering with a mulch of compost or leaf mould will help prevent damage to your soil by heavy rain.

Further information on looking after your soil can be found here:

<https://www.gardenorganic.org.uk/expert-advice/garden-management/soil>

Water Smart is a project run by Garden Organic funded by Warwickshire County Council. It is helping communities manage flooding and drought in gardens.