Water holding capacity of soil experiment

SAFETY CONSIDERATIONS

Take care when using an oven or incubator as they and any equipment you put in them will be hot and could burn you.

Background

Plants source of water comes from the soil and has to travel via the roots and vascular system to the leaves where photosynthesis and transpiration occurs. In order for these processes to continue, the soil where the root hairs are in need to have high levels of water to supply the plant. Thus, one of the factors that can affect transpiration is the water holding capacity of the soil.

The water holding capacity of soil is a measure of how much water can be held by the soil after it is fully saturated with water. Several factors can affect the water holding capacity, including how porous the soil is and the nature of the soil particles itself.

In this experiment, we will be identifying the water holding capacity of the soil common to the area of your choice. This experiment can be extended as part of the investigation for Unit 1 VCE Biology Area of Study 3.

Materials

- Oven or incubator
- Baking tray
- Soil sample
- Scales
- Retort stand
- Retort clamp
- Large funnel
- Filter paper
- 100 mL measuring cylinder
- 100 mL beaker
- Cling wrap
- Toothpick

Methods

1. Spread the soil sample on the baking tray to create a layer that is around 0.5 cm.
2. Place soil in an oven or incubator at 105°C until soil is dry.

   ***If the experiment is to be repeated, record how long the drying process took as a control.
3. Using heat proof gloves, remove the soil from the oven or incubator and allow it to cool to room temperature on a heat proof mat.
4. Zero the scale with a 100 mL beaker.

5. Weigh out approximately 50 g dry soil into the 100 mL beaker.
6. Record initial weight of soil.
7. Secure the funnel onto the retort stand using a retort clamp.
8. Fold the filter paper so that it fits into the top of the funnel.
9. Place the 50 g dry soil on to the filter paper.
10. Measure 100 mL of water in the measuring cylinder.
11. Place an empty 100 mL beaker under the funnel.
12. Add 100 mL of water to the dry soil.
13. Place cling film over the top of the funnel to prevent evaporation.
14. Pierce a few holes into the cling film to maintain atmospheric pressure on the soil.
15. Leave overnight to drain.
16. Zero the scale with a 100 mL beaker.
17. Weigh hydrated soil on scale.
18. Record final weight of soil.

Results

Initial weight of soil (g): _____

Final weight of soil (g): _____

Final weight (g) – Initial weight (g) = Water held in soil (mL): _____

Water holding capacity: (Water held in soil (mL) ÷ Initial weight (g)) x 100 = _____%