

Background

Soil scientists determine what organisms are present in a sample area by taking a series of soil samples and extracting the organisms back in a laboratory. Different extraction techniques are suitable for different organisms, so scientists pick their method depending on which organism they want to measure. An extraction technique based around a Berlese-Tullgren apparatus is suitable for most small soil invertebrates.

Bait bags attract soil organisms so you can observe them in their own environment. This is a useful technique for seeing what soil organisms are present in an area.

Part 1 – Taking a soil sample

Purpose

The purpose of this activity is to collect a soil sample from which you will extract soil animals back in the laboratory.

Materials

- sampling ring
- trowel
- scraper
- permanent marker pen
- plastic freezer bag and tie
- wooden board
- mallet
- safety glasses

Safety note

Use care when handling soil and compost. Do not ingest or smell the soil or compost and avoid inhaling its dust since harmful bacteria and fungi could be present. Wash your hands thoroughly with soap and water afterwards.

Method

1. Push a sampling ring into the soil until its top lip is 1 cm above the soil surface. If the ground is hard you can tap the ring into the soil by placing a wooden board over the top, and hitting it lightly with a mallet. If there's a very thick layer of leaf litter above the soil, brush it off so that it's level with the top of the ring.
2. Slide a scraper straight underneath the ring. This stops loss of soil when the sample is lifted out.
3. Place the sample, still in its ring, into a plastic bag. Seal the bag so nothing can escape, then label it and take it back to the laboratory.



Part 2 – Extracting soil animals

Purpose

The purpose of this activity is to separate out the soil animals from your soil sample. The extraction technique (called a Berlese-Tullgren extraction) uses heat and light of a lamp to force soil animals down through the soil and out into a collecting container below.

Materials

- soil sample
- funnel and beaker (made from a 1.5 L drink bottle)
- 70 mL lidded collecting container, with 1 cm plaster of Paris and charcoal
- 1 x mesh (aluminium flywire)
- 2 x gauze swabs
- 40 W microscope lamp

Method

1. Place the collecting container, with its lid off, inside the plastic beaker, and rest the funnel over the top. The collecting container's damp plaster of Paris base will help keep your soil animals alive.
2. Place one layer of mesh and two layers of gauze swabs inside the funnel. These prevent chunks of soil falling into your collecting jar, but still allow the soil animals through as they move away from the lamp's heat.
3. Empty your soil sample into the funnel, shaking any loose bits of soil from the bag.
4. Place the lamp about 7 cm above the funnel.
5. Check the equipment daily. As the sample dries out you should start to see tiny soil animals in the collecting container underneath. Make sure the plaster of Paris base stays slightly damp (but not soaked), otherwise your soil animals will cook!



Part 3 – Setting up a bait bag

Purpose

The purpose of this activity is to assemble a bait bag that will attract soil animals.

Safety

Use care when handling soil and compost. Do not ingest or smell soil or compost, and avoid inhaling its dust since harmful bacteria and fungi could be present. Wash your hands thoroughly with soap and water afterwards.

Materials

- enough plastic mesh to tie into a bag (an onion bag or hair net will do)
- plastic name tag
- plant material: a mixture of vegetables and fruit scraps, plus some dry leaves, paper and small twigs
- string
- watering can
- trowel
- plastic tray
- scissors
- tweezers
- hand lens
- microscope
- safety glasses

Method

1. Fill your bait bag with a mix of plant material, ensuring there is a combination of wet material (eg apple cores, lettuce leaves, tomato slices) and dry material (eg dry leaves, small twigs). Make sure everything is really well mixed together.
2. Tie the bag shut and attach your name tag to one end.
3. Bury the bag lengthways, just below the soil surface, with the tag showing so you can find it again. The bag should be in the top 20 cm of the soil.
4. Water the area lightly. If the weather is hot and dry then you may need to water the area once a week to ensure it stays slightly moist, or pick an area in the shade to stop it drying out too quickly.
5. Leave the bait bag in place for two to three weeks (the cooler the weather, the longer you leave it).
6. Gently dig up the bag, place it on a tray and carry back to the lab.
7. Cut open the bag and use tweezers to sort through its contents. See which soil animals you can find with your naked eye, a hand lens and under the microscope.

