

Exploring biochemistry: Microbiome Respiration



· EXPLORE ·
SOILS

Summary:

Soils contain a huge number of organisms and while you may have explored those we can see (eg. worms and springtails), there is a larger number still present in the soil of single-celled organisms such as bacteria and protozoas. These organisms are the main agents in nutrient cycling in soils and their impact on the carbon cycle can be demonstrated, but not instantly.

Learning Objectives:

- Gain understanding of microscopic soil community/organisms
- Increased understanding of nutrient cycling within soil
- Understanding of the role of microorganisms in decay
- Knowledge of the process of respiration of of microbes

Equipment:

- 1 jar with airtight lid
- Soil from garden
- Sugar
- Compost
- Plastic bottle
- Water
- Lime water

Preparation:

Estimated time 5-10 minutes.

Soil sample gathering

Preparing weak sugar solution (approximately 5g sugar:100ml water)

Time Required:

Introduction to activity, ~3 mins

Construct soil chamber and insert limewater ~5 mins

Activity total timing ~10 minutes.

Evidence of microbial respiration will be viewable within 2-7 days.

Background Learning Needs:

- Understanding of microbes - desirable
- Understanding of carbon cycle - desirable
- Understanding of respiration of bacteria

Risk Assessment:

Hazard	Likelihood	Severity	Mitigation
Illness from soil ingestion	Low	Medium/High	Use gloves when handling soil
Injury from broken glass	Low	Medium/High	Clean away broken glass immediately
Site/local specific risks	Unknown	Unknown	Anyone running this activity is advised to conduct a risk assessment for the specific site and conditions

Description of Activities:

1. Ensure the soil is broken up into a crumb, fill the jar to approximately 2/3's full
2. Cut the top ~7cm off the top of a 500ml drinks bottle and screw cap on firmly
3. Push the capped end of the bottle firmly into the soil, leaving ~3cm exposed above the surface of the soil
4. Water the soil with the sugar water, so that it is damp throughout but not pooling
Add the lime water to the bottle top, fill up to 1cm above the soil surface, so it is visible above the soil
5. Close the jar and place in a dark and warm environment.
6. Check the soil jar on a daily basis to see if the colour of the limewater alters and when this is. Increasing cloudy colouring of the limewater will show the presence of CO₂ in the jars air.



Potential Extension:

Water the soil until it is waterlogged and repeat the exercise this will show, to an extent, if the soil produces CO₂ at a slower or faster rate when in anaerobic conditions.