Field Studies Council

Can be used as GCSE biology sampling practical

Investigating lichens

Reference: [1]Sheldrake, M, 2021, available at: www.wildlifetrusts.org/blog/guest/look-lichen
Image Credit: Lichens; Robin Crump

Lichens are organisms which grow on **surfaces such as trees or stone**. They are formed of two (or sometimes more) organisms in a **mutualistic symbiotic** relationship; this means that the organisms work together to live and grow. The first organism is an **algae** which provides energy through **photosynthesis**. The second is a **fungus** which provides protection and structure.

Lichens cover more of the planet than tropical rainforests [1]. They are often a keystone species which help to form habitats as **pioneer species**. They help to protect trees, are an important food source and provide nesting materials to birds.

Fieldwork aim:

To investigate how aspect influences lichen abundance and species richness

Refers to **positioning** (e.g. the southern aspect of our tree is the one facing south). In the northern hemisphere, southern aspects will get more hours of sunlight [2]. Southern aspect will have **greater light intensity.**

How might this impact:

- Temperature?
- Moisture?
- Other abiotic factors?

The method we have here looks at the aspect of trees, but there is no reason why this couldn't also be done on stones or buildings. Think about how you'd need to change the method!

How **much of lichen there is**, for example it might cover 30% of a tree.

How many different species there are in an area. For example, if there was 4 species of lichen, even if there is only a small amount of one species and a large amount of another, the species richness would be 4.

Abundance and species richness together can tell us how easy it is for lichen to grow in an area.

Make a hypothesis:

Which side of the tree do you expect lichens to be more abundant on? Can you explain why you think so?

This fieldwork can be carried out anywhere which is available to you – this could be a woodland, a park, a graveyard, or in a garden.

Methodology

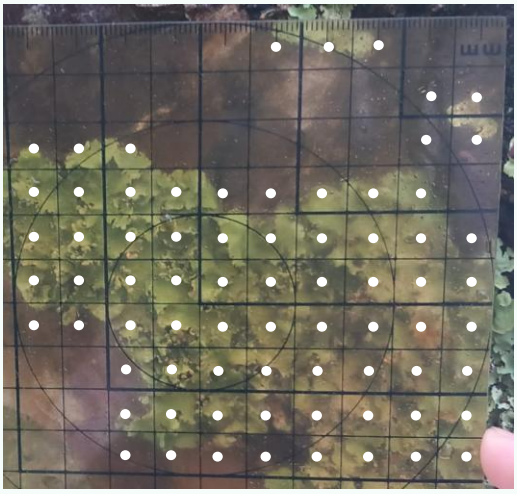
1. Choose a tree.
2. Using your **compass**, work out which side of the tree is facing south.

3. On the southern aspect, place your **quadrat** at a fixed height using your **ruler**.
4. Identify the lichen in your quadrat with your **identification guide** and record how many species there are (your **species richness**).
5. Measure the **abundance** of lichen using percentage frequency. This means you count the number of squares which have any lichen in (no matter how much or little). There are 100 squares in a 10 x 10 grid, so each square is equal to 1%.
6. Repeat steps 3 - 5 for the north facing side of the tree.

One tree is unlikely to be **representative**, repeat the method several times and see if you get the same results.

Equipment

- A compass or compass app
- Ruler
  A meter ruler is ideal but any length will work
- A small (e.g. 10 cm^2) clear 10 x 10 gridded quadrat
  If you don't have one you can draw one onto a poly pocket with a marker
- A lichen identification guide
  You could buy a physical guide from Field Studies Council or use an app like Seek



Abundance: 73 squares = 73% cover

Species richness: 1 (*Parmotrema perlatum*)

Further Investigations...

Is there anything else which might be impacting lichens in this area?

Lichens are a **bioindicator** for pollution, the species present tell us about the air quality. Some species only grow in high nitrogen concentrations, and some only grow in low nitrogen concentrations. One source of nitrogen is car exhausts. How could you use this in an experiment? You could look at the OPAL air quality survey for ideas!