

Lichen Information Sheet



What are Lichens?

Lichens are microscopic ecosystems containing fungus, algae, and/or special types of bacteria that all live together and depend on each other. This is called a '**Symbiotic**' relationship. The lichen fungi need carbon as a food source to survive. This is provided by the algae or bacteria; in return they are given shelter by the fungi. Lichen lives on trees, rocks and buildings.

Lichens resemble coloured dots or clumps. They sometimes look like someone splattered paint on a tree branch. Their colours range from green to brown, white, and red. Even in though they are brightly coloured they are easy to miss at first glance.

There are lot of different types of lichen, but they all grow in one of three ways. They can be branched like little plants, have crinkly small leaves, or develop as a crust on a surface.

Lichens as air pollution indicators

Lichens can tell us a lot about the air we breathe. Without the presence of air pollution, fresh clean air feels amazing in our lungs. Lichens, too, enjoy clean air; in fact, their sensitivity to air pollution makes them effective air quality sensors.

Lichens can tell us about the consequences of air pollution on ecosystems, as well as showing us which pollutants are present in the atmosphere. This is useful if you want to understand how air pollution affects natural communities and find out where air pollution is high.

Lichens obtain their nutrition from the air. Because lichens lack roots and protective surfaces, they are unable to filter what they absorb so any pollutants become trapped inside them. If the concentration of pollutants inside lichens gets too high the lichen will die or show signs of harm. The two pollutants that mostly affect lichens are oxides of nitrogen and sulphur dioxide. Lichens are easy to study and respond fast to environmental changes.

Remember:

Bushy lichens – usually need really clean air

Leafy lichens - can usually survive in a small amount of air pollution

Crusty lichens – can usually tolerate quite a lot of pollution



The **oakmoss lichen** is a type of bushy lichen that is very sensitive to nitrogen levels in the air.



Usnea lichens, commonly known as 'old man's beard' don't like sulphur dioxide pollution. They will only grow in places where coal or wood hasn't been burned for a very long time. If you were to find some 'old man's beard' lichen in Bradford that would be a very good sign as many years ago the mills in Bradford used to emit lots and lots of sulphur dioxide pollution.



A banner for the Clean Air Schools Programme. The background is a teal color. On the left, there is a cartoon illustration of a young boy with dark skin, wearing a yellow shirt and orange pants, waving. In the center, there is a green school building with a clock tower and the word 'SCHOOL' on the front. To the right of the school is a white sign with a black border that says 'Cleaner Air' at the top, has a green circular logo with a white cloud and a green leaf-like shape inside, and 'AHEAD' at the bottom. At the bottom left, there is the City of Bradford Metropolitan District Council logo, which includes a coat of arms and the text 'City of BRADFORD METROPOLITAN DISTRICT COUNCIL'.

Not all lichens dislike air pollution. Most lichens will die in the presence of nitrogen and sulphur dioxide, but some types will actually grow.

Lichens like **golden shield** thrive where there is lots of nitrogen-based pollution. It is commonly found on trees and buildings near farmland and on sea cliffs where seabird droppings and fertilisers provide extra nitrogen. In cities and towns lots of nitrogen-based pollution is created by cars and gas boilers so you may see some nitrogen loving lichens growing near very busy roads or close to houses and factories.



Learning a few common lichen species will allow you to assess nitrogen-based pollution levels in your area.

Next time you are out and about see what lichens you can spot. How do the lichens near where you live differ from those you see at school or other places you visit like a park?

Today we are going to look at the lichens near your school.

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What you'll need:

- Your survey sheet • A pencil •

You may also want to take a map and a camera to mark where you've studied and take photos of the lichen found.

Instructions:

1. Try to do the survey when the weather is dry. Some lichens change colour in the rain, which could make it more difficult to work out what type they are.
2. Look for an area with deciduousⁱ trees (oak, ash) and lots of light.
3. Choose 2 trees to study. Ones with a single trunk are best.
4. On your survey sheet, record the type of lichen you can see and the total amount on the side of the tree trunk you have chosen.

If there's none of that lichen type, tick the low. If you see a small to medium amount (less than 1 sheet of A4 in total), tick the medium.

If you find a large amount overall (more than one A4 sheet in total), tick the high.

If you'd like to record the amount of lichen you spot in more detail, you could use a scale from 0 to 5, with 3 representing roughly half an A4-page of lichen.





5. Look at the results you've collected (you can do this back in your classroom) and decide what you think it's telling you about the amount of pollution in the air around you.

Remember, the more pollution-loving lichen you saw, the more polluted the air is likely to be.

6. If your research indicates that the air around you is likely to be polluted, what do you think could be causing the pollution?



Survey Sheet:

	Area of tree covered					
	Tree 1			Tree 2		
	Dislikes nitrogen					
 Usnea Lichen	<input type="checkbox"/>	<input type="checkbox"/>	Low	<input type="checkbox"/>	<input type="checkbox"/>	Low
	<input type="checkbox"/>	<input type="checkbox"/>	Medium	<input type="checkbox"/>	<input type="checkbox"/>	Medium
	<input type="checkbox"/>	<input type="checkbox"/>	High	<input type="checkbox"/>	<input type="checkbox"/>	High
 Evernia	<input type="checkbox"/>	<input type="checkbox"/>	Low	<input type="checkbox"/>	<input type="checkbox"/>	Low
	<input type="checkbox"/>	<input type="checkbox"/>	Medium	<input type="checkbox"/>	<input type="checkbox"/>	Medium
	<input type="checkbox"/>	<input type="checkbox"/>	High	<input type="checkbox"/>	<input type="checkbox"/>	High
 Hypogymnia	<input type="checkbox"/>	<input type="checkbox"/>	Low	<input type="checkbox"/>	<input type="checkbox"/>	Low
	<input type="checkbox"/>	<input type="checkbox"/>	Medium	<input type="checkbox"/>	<input type="checkbox"/>	Medium
	<input type="checkbox"/>	<input type="checkbox"/>	High	<input type="checkbox"/>	<input type="checkbox"/>	High
	Thrives on nitrogen dioxide					
 Leafy xanthoria	<input type="checkbox"/>	<input type="checkbox"/>	Low	<input type="checkbox"/>	<input type="checkbox"/>	Low
	<input type="checkbox"/>	<input type="checkbox"/>	Medium	<input type="checkbox"/>	<input type="checkbox"/>	Medium
	<input type="checkbox"/>	<input type="checkbox"/>	High	<input type="checkbox"/>	<input type="checkbox"/>	High





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 <p>Cushion xanthoria</p>	<table border="1"> <tr><td></td><td>Low</td></tr> <tr><td></td><td>Medium</td></tr> <tr><td></td><td>High</td></tr> </table>		Low		Medium		High	<table border="1"> <tr><td></td><td>Low</td></tr> <tr><td></td><td>Medium</td></tr> <tr><td></td><td>High</td></tr> </table>		Low		Medium		High
	Low													
	Medium													
	High													
	Low													
	Medium													
	High													
 <p>Physica</p>														

ⁱ A deciduous tree is one which loses its leaves in autumn.



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SCHOOL