

Qualification Name: Biology (Gateway)

J247/04 Biology A B4-B6 and B7 (Higher Tier)

Question Set:1

1

Some students are investigating lichens.

Lichens are often studied because they are sensitive to pollution.

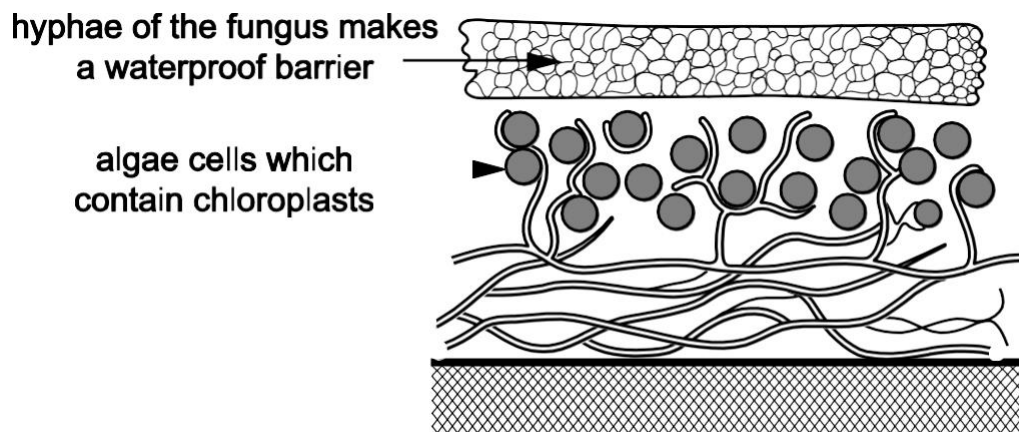
- (a) Lichens are made up of two different organisms: a fungi and algae. Both the fungus and the algae gain from living together.

What biological name is given to a relationship where both organisms gain?

Mutualism

[1]

- (b) The students find a diagram of a lichen.

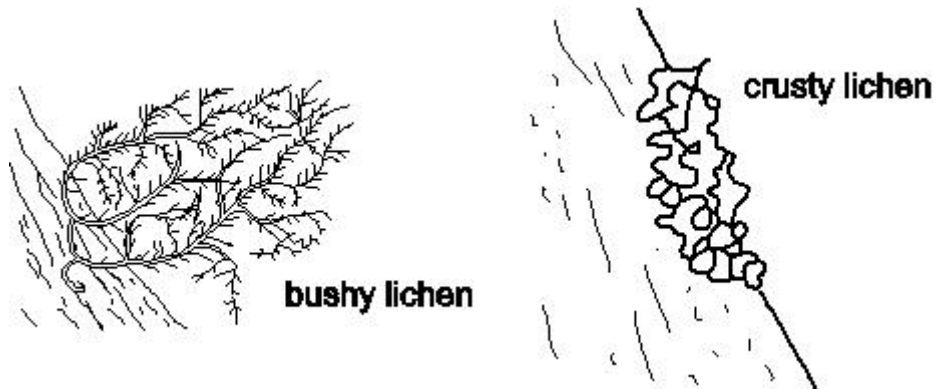


Using the information from the diagram suggest what the algae and fungi each gain from their relationship.

Algae gain protection and fungi gain sugars.

[2]

- (c) Lichens are sensitive to pollution because they take up chemicals from the air. The diagram shows a 'bushy' species of lichen and a 'crusty' species of lichen.



Bushy lichens are usually more sensitive to pollution than crusty lichens. Use the diagrams to suggest why.

They have a larger surface area so take up more pollutants.

[1]

- (d) The students decide to use lichens to try and work out how polluted their school grounds are.

They read about a scale called the Lichen Diversity

Value (LDV). It is worked out in this way:

- choose four trees in the area
- hold a quadrat on the north side of the trunk of one tree
- count the total number of all the lichens in the quadrat
- then do this on the east, south and west side of the tree
- repeat this for each tree.

- (i) Suggest how the students could choose four trees.

Use random numbers

[1]

(ii) The students put their results into a table.

Number of individual lichens found in each quadrat				
Tree number	North	East	South	West
1	3	11	18	7
2	4	12	17	8
3	5	10	15	12
4	4	15	12	9
mean	4.0	12.0	15.5	9

The LDV is found by adding together the four mean values.

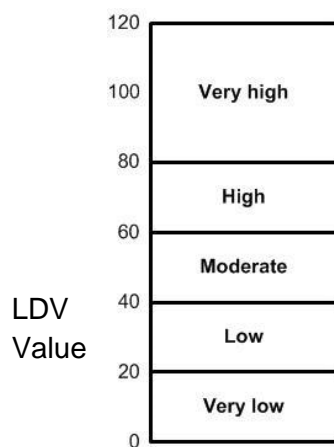
The students calculate the mean number of lichens on the north, east and south sides of the trees.

Calculate the mean for the west side and use this to calculate the LDV.

$$\frac{7+8+12+9}{4} = 9 \text{ mean} \quad 9+12+4+15.5 = \underline{\underline{40.5}}$$

[2]

(iii) This scale shows the diversity of the lichens shown by the LDV.



What does the LDV show about the diversity of lichens in the school grounds?

Moderate diversity which is just above low.

[2]

(iv) LDV is calculated by counting all the lichens present.

What else about the lichens could the students look for to make a better assessment of pollution?

First identify the species of lichens present in their sample and find out how sensitive to pollution these lichens are. If the lichens are mostly pollution sensitive species = low pollution levels.

[3]

Total Marks for Question Set 1: 12

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