# Investigating the growth of pleurococcus on tree trunks

## Factors to consider/have an effect

- ★ Type of tree
- ★ Height
- ★ Light intensity
- ★ Temperature

# Observations

## Preliminary method

- ★ On your tree, use a compass to find out which side of the tree is north.
- ★ Then place your grind against the tree trunk and count how many squares have growth on them.
- ★ Write your results down in a table and repeat for east, south and west.

## Preliminary results

| Tree number | Site 1 North | Site 1 East | Site 1 South | Site 1 West | Site 2 North | Site 2 East | Site 2 South | Site 2 West |
|---|---|---|---|---|---|---|---|---|
| **1** | 25 | 24 | 4 | 25 | 9 | 1 | 12 | 4 |
| **7** | 20 | 11 | 25 | 13 | 25 | 13 | 16 | 18 |
| **5** | 22 | 25 | 22 | 23 | 5 | 3 | 0 | 1 |
| **4** | 25 | 20 | 11 | 13 | 25 | 13 | 18 | 16 |
| Total | **87** | **71** | **76** | **74** | **60** | **27** | **53** | **39** |

## Preliminary information

Pleurococcus is the most common green algae and grows on the tree trunks, poles and stonewalls. It is mostly found on the north side of the trunk at the bottom. To grow it needs a lot of, moisture and shade although it still needs sunlight and water like most trees and plants. However green algae do not have any roots. They do not have any leaves or stomata therefore it does not have any water saving protection. They are single celled and have to grow in clumps to avoid desiccation. This means it increases surface area and stops them drying out.

# Preliminary prediction

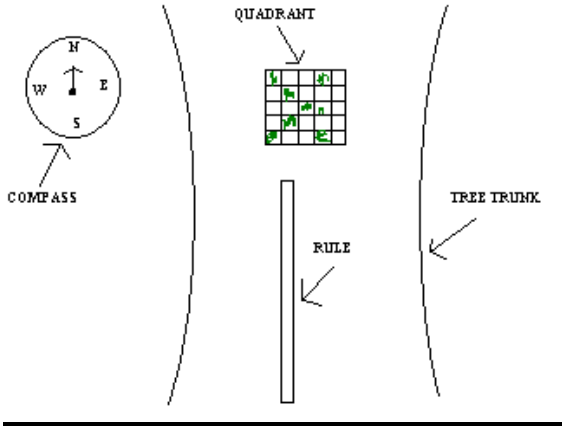
Based on the preliminary information I can predict that the pleurococcus will grow best on the north side and at site 1. In this area it is shady and there is a lot of moisture

as well.

## Apparatus

- ★ Compass- to find correct side of tree trunk.
- ★ 1 metre rule- to make it fair so it is same distance of the ground
- ★ Quadrate - measure how much pleurococcus there is.
- ★ Data log it- measure the light intensity

## Diagram




## Fair testing

- ★ Keeping the height on the tree trunk the same
- ★ Random numbers given to trees
- ★ Results to betaken at same time
- ★ Results to be taken same time of day

## Plan/Method

- ★ We are going to use the compass to find which side of the tree is north.
- ★ Using the metre rule, we are going to measure a metre up the tree trunk from the bottom.
- ★ We are then going to use the quadrant to count how much pleurococcus is on the tree trunk.
- ★ Using the data log it, we are going to measure the light intensity.
- ★ We are going to record our results in a table.

★ Repeat the previous steps for east, south and west.

## Results table

### Site 1

| Tree Number | Tree name | North LI % | North PC | South LI % | South PC | East LI % | East PC | West LI % | West PC |
|---|---|---|---|---|---|---|---|---|---|
| 1 (7) | Sycamore | 78 | 25 | 77 | 15 | 80 | 3 | 81 | 2 |
| 2(3) | Hawthorn | 72 | 23 | 75 | 25 | 77 | 5 | 79 | 25 |
| 3(11) | Sliver birch | 79 | 12 | 82 | 10 | 76 | 25 | 78 | 25 |
| 4(8) | Lime | 76 | 25 | 78 | 25 | 76 | 25 | 78 | 25 |
| 5(5) | Crab apple | 76 | 18 | 79 | 23 | 81 | 16 | 78 | 25 |
| **Total** | | 103 | | 98 | | 57 | | 92 | |

### Site 2

| Tree Number | Tree name | North LI % | North PC | South LI % | South PC | East LI % | East PC | West LI % | West PC |
|---|---|---|---|---|---|---|---|---|---|
| 1 (7) | Willow | 77 | 24 | 78 | 24 | 78 | 25 | 77 | 25 |
| 2(3) | Plane | 81 | 20 | 80 | 15 | 80 | 10 | 82 | 3 |
| 3(11) | Sliver birch | 78 | 12 | 82 | 12 | 82 | 11 | 63 | 9 |
| 4(8) | Almond | 82 | 21 | 80 | 5 | 76 | 25 | 83 | 2 |
| 5(5) | Ash | 72 | 20 | 81 | 23 | 81 | 3 | 82 | 3 |
| **Total** | | 103 | | 69 | | 74 | | 42 | |

**LI = light intensity**
**PC = pleurococcus count**

## Conclusion

From this investigation I can tell that the amount of algae was most found on the north side of the tree trunks on site 1. From my graph I can say that it clearly shows that pleurococcus grows best on the north side of the tree on both site 1 and site 2. Both north sides on site 1 and 2 had the same amount of algae. The reason why this was a popular side for the algae to grow is because is shadier than the other 3 sides although it is gets a reasonable amount of sunlight. Also there is moisture on this side of the tree trunk. These are all the things algae needs to grow and all of them were

found on the north side of the tree. I also did a Chi-squared test both my results from both sites were rejected therefore the reason why most algae grows on the north side is due to environmental factors.

## Chi- squared test

### Site 1

$103 + 98 + 57 + 92 = 350 \div 4 = 87.5$

Expected value = 87.5

$X = \Sigma (O-E)^2 \div E$

### North

$X = \Sigma (O-E)^2 \div E$

$= \Sigma (103 - 87.5)^2 \div 87.5$

$X = 2.75$

### South

$X = \Sigma (O-E)^2 \div E$

$= \Sigma (98 - 87.5)^2 \div 87.5$

$X = 2.75$

### East

$X = \Sigma (O-E)^2 \div E$

$= \Sigma (57 - 87.5)^2 \div 87.5$

$X = 10.63$

### West

$X = \Sigma (O-E)^2 \div E$

$= \Sigma (92 - 87.5)^2 \div 87.5$

$X = 0.23$

Chi-Square value = 2.75 + 1.26 + 10.63 + 0.23 = 14.87

∴ Reject - therefore it must be due to environmental factor

**Site 2**

103 + 69 + 74 + 42 = 288 ÷ 4 = 72

Expected value = 72

$X = \Sigma (O-E)^2 \div E$

**North**

$X = \Sigma (O-E)^2 \div E$

$= \Sigma (103 - 72)^2 \div 72$

X = 13.34

**South**

$X = \Sigma (O-E)^2 \div E$

$= \Sigma (63-72)^2 \div 72$

X = 1.125

**East**

$X = \Sigma (O-E)^2 \div E$

$= \Sigma (74-72)^2 \div 72$

X = 0.05

**West**

$X = \Sigma (O-E)^2 \div E$

$= \Sigma (42-72)^2 \div 72$

X = 12.5

Chi-Square value = 12.5 + 0.05+ 1.125 + 13.34 = 27.015

∴ Reject - therefore it must be due to environmental factor

## Evaluation

The results of my investigation were of good quality but I think there were a few errors in them. They showed that the amount of pleurococcus on both site 1 and 2, north side of the tree trunk were there same. This might be just a coincidence. The investigation was done fairly and produced fairly accurate results. If I had another opportunity to do this investigation, I would test more trees so I get a wider variety of results. I would also consider testing only one type of tree to make it fairer. I could also take a large number of readings and find the average.

As light intensity was only taken on one day, to make it fairer I could take the readings over a week and then use the average reading in my investigation. Also I could investigate other factors. For example I could consider the temperature and wind. I could also investigate height on tree and the distance of the tree away from buildings.