

# **BIO LAB REPORT**

## **Comparing transpiration rates on different sides of a leaf**

Aim: To compare the rates of transpiration between the lower and upper surface of a leaf.

Hypothesis: Leaf A will have the greatest change in mass, whereas leaf C will have the least change in mass. This is because leaf A is covered on the upper surface which will allow a lot of transpiration to take place. Leaf C will have the least evaporation taking place as the entire leaf is covered with Vaseline.

Scientific theory: Transpiration is the evaporation of water from aerial parts of plants, especially leaves but also stems, flowers and fruits. Transpiration is a side effect of the plant needing to open its stomata in order to obtain carbon dioxide gas from the air for photosynthesis. Transpiration also cools plants and enables mass flow of mineral nutrients from roots to shoots. Mass flow is caused by the decrease in hydrostatic (water) pressure in the upper parts of the plants due to the diffusion of water out of stomata into the atmosphere. Water is absorbed at the roots by osmosis, and any dissolved mineral nutrients travel with it through the xylem.

The rate of transpiration is directly related to whether the stomata are open or closed. The amount of water lost by a plant depends on its size, along with the surrounding light intensity, temperature, humidity, wind speed, and soil water supply. The reason that an increase in temperature will cause an increase in transpiration rate is because an increase in temperature will cause more water to evaporate from the cell walls inside the leaf. This will increase the water potential gradient between the leaf interior and the outside air causing water to leave the leaf more quickly, thereby increasing the rate of transpiration.

Variables: Independent- Mass and size of the leaves

Dependant- Change in mass of the leaves

Constant- Amount of vaseline put on the leaves; Time

Apparatus: A plant with stomata found mainly on the lower surface, eg: dicotyledonous leaves; a weighing machine; threads; vaseline; a scalpel.

Method/ Procedure (In Steps):

Step 1: Cut off three leaves of about the same size and surface area. Coat the petioles with Vaseline to prevent evaporation of water from the petioles.

Step 2: Tie a thread to the end of each petiole so that the leaf can be hung up to dry. Note down the condition of each leaf, i.e. turgid or flaccid, withered or not.

Step 3: We then treat the leaves as follows-

Leaf A: Cover the upper surface with a thin layer of Vaseline.

Leaf B: Cover the lower surface with Vaseline.

Leaf C: Cover both surfaces with Vaseline.

Step 4: Weigh each leaf and record your results.

Step 5: Hang up the three leaves where they can receive sunlight.

Step 6: After a few hours observe the conditions of the leaves. Record your observations in a table which you are supposed to construct to note the observations.

Step 7: Weigh the leaves again and record the readings.

Results:

	INITIAL MASS	MASS AFTER VASELINE	MASS AFTER THE EXPERIMENT	CHANGE IN MASS (%)
LEAF A	0.78 gms	0.80 gms	0.61 gms	23.75
LEAF B	0.79 gms	0.82 gms	0.76 gms	7.3
LEAF C	0.84	0.86	0.81	5.81

We did not repeat any readings because of lack of time otherwise our readings would have been much more accurate by taking averages.

Analysis:

My results match my hypothesis which makes it a successful experiment. In Leaf A the Vaseline is on the top so there will be a lot of transpiration taking place as stomata pores on the underside of the leaf transpire the most and the fastest as a lot of stomata are present here. On the other hand Leaf C has been covered from all sides and will have the least change in mass.



Evaluation:

My investigation was a successful one as my predictions were proved right. The leaves set up in such a way that it was clear as to which leaf would transpire the most and which leaf would transpire the least. My results do not show a definite conclusion as Leaf C should have not changed in mass. My results could have been more accurate by repeating this experiment a number of times and doing it at different times of the day. This experiment could have also been more accurate if we had covered the stalk of the leaf also.