

Transpiration lab report

Business



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When water is transported from the roots to the mesophyll cells in the leaves, it evaporates out the stomates, called transpiration, to create a lower osmotic potential. Osmotic potential is the part of the water potential of a tissue that results from the presence of solute particles. Even though the stomates open to release water, it also brings in carbon dioxide to produce sugar and oxygen through a process of photosynthesis.

The water absorbed by the roots is moved by osmosis, root pressure, adhesion, and cohesion from high to low areas of water potential. From the roots, water is transported with osmosis with a pressure pulling the water and minerals up towards the leaves. It is the transpirational pull moving it up with the help of cohesion and adhesion. Transpiration decreases the water potential causing water to move in and pull upward into the leaves and other areas of low water potential. Loss of water through transpiration can be facilitated by the opening and closing of the stomata depending on environmental condition. The rate of transpiration depends on several environmental factors such as light, humidity, temperature, and air movement, while the rate of evaporation depends on the water potential gradient, which is contributed by gravity, pressure, and solute concentration.

The purpose of this experiment is to measure pressure changes on the different types of environmental factors that affect the rate of transpiration. Hypothesis If the temperature of an environment increases, then the rate of transpiration in plants will increase and will reduce the surface area of leaves. Materials This lab requires a LabQuest, Vernier Gas Pressure Sensor, utility clamps, ring stand, a leaf with its stem, plastic tubing clamps, a pipette, a refrigerator, 300 milliliter beaker, plastic syringe, water, and <https://assignbuster.com/transpiration-lab-report/>

graphing paper. Procedures First, connect the utility clamp on the ring stand with the Gas Pressure Sensor. Then, connect the plastic syringe to one end of the 36-42 centimeter plastic tube. Place the other end of the tube in a 300 milliliter beaker of water.

Then, use the syringe to draw water up into the tube until it is full. After that, connect the plastic tubing clamp on the tube. While bending the tube to make it into a U towards the sky, remove the syringe without spilling any water. Then, put the leaf with its stem in the opening of the tube with the end with the plastic tubing clamp. Carefully push the stem down of tube without spilling, and then squeeze the clamp shut.

Then, connect the plastic tube to the Gas Pressure Sensor. There should be a mark on the tube at the starting water to remember for refill later on. Then, the Sensor should be connected to the LabQuest. Collect data for fifteen minutes for the pressure. Then, place the leaf onto graphing paper and trace it.

Find the number of surface area. After that, place the leaf in a refrigerator. Clean up the materials and return the next day. Take the leaf out of the refrigerator and set up the equipment again. Connect in the LabQuest, and then find the data of the pressure for fifteen minutes. Then, place the leaf onto graphing paper and trace it.

After that, calculate the surface area of the refrigerated leaf. Remember to record down other classmates variables of their different environmental conditions. The measurement techniques were to tap the bubbles inside the tube. Also, it is important to trim the stem at a forty five degree angle. The <https://assignbuster.com/transpiration-lab-report/>

control is the plant with the room temperature and calculated pressure. The independent variable is the temperature change.

The dependent variable is the pressure and surface area of the leaf. Data Collection and Analysis Test| Slope(kPa/s)| Surface area (cm²)| Rate/area (kPa/s/cm²)| Adjusted rate (kPa/s/cm²)| Experimental Value| M=-0.

0002984| 36 cm²| 8.28 x (10⁻⁶)| 1.52 x (10⁻⁶)| Control| M= 0.

00031771| 47 cm²| 6.75 x (10⁻⁶)| Class Data| Test| Adjusted rate (kPa/s/cm²)| Light| -1.9233 x (10⁻⁴) (kPa/s/cm²)| Humidity| 7 x (10⁻⁹) (kPa/s/cm²)| Wind| | Temperature| 1.52 x 10⁻⁶ (kPa/s/cm²)| The rate of transpiration affected in each of the experimental situations as compared to the control varied. As the light, temperature, and wind increased, the rate of transpiration increased as well.

However, as the humidity increased, the rate of transpiration decreased. The wind variable resulted in the greatest rate of water loss because the wind is kinetic energy that breaks water free and turns it into vapor faster. Plants have adaptations to enable them to increase and decrease water lost including the shedding of leaves in colder temperatures, the opening and closing of the stomata, thicker cuticles, and different shape of leaves depending on the environment. An advantage of closed stomata on a plant is that the plant loses water through the stomata; however to save the water it can close it. A disadvantage is that the open stomata takes in carbon dioxide for photosynthesis, but when it is closed it cannot take in carbon dioxide.

The light and the fan decreased the water potential in the leaves and water moved up the stem by the transpiration pull. Conclusions During this

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experiment, it was found out that as temperature increases, the transpiration increased as well and as temperature decreases, the transpiration decreased as well. Therefore, this supports the hypothesis. For the class, it was found out that as sunlight increased, transpiration increased. As wind increased, transpiration increased.

As humidity increased, however, transpiration decreased. These conditions led to the increased water potential gradient which causes the transpiration pull to be stronger. The control plant for all of these conditions should be the one with the most normal and stable environment. In this experiment, there were a few experimental errors such as measurement errors and incorrect use of equipment. The sensor valve was connected to the plastic tubing too early, and therefore the lab had to be restarted.

There were also some technical difficulties with the LabQuest because the time length was set differently than the instructions. To improve this experiment, there should be two experimental temperature conditions. One was the refrigerator and the other one should be beside a heater. This will allow one to see the difference in temperature changes of hot, room temperature, and cold.