

Transpiration Lab

Question: How do various environmental variables affect the rate of transpiration in plants? How does transpiration differ between species of plants?

Hypothesis:

- Should be based off of the factor that you test
- If, then statement
- Predict what factors cause the most to least amount of transpiration: control, wind, light, heat, and humidity

Variables: Independent, Dependent, Control, and Constants (at least 2)

Materials: List all the materials used in the lab

Procedure: See lab handout

Part 1: Leaf surface area and stomata frequency

Reflection Questions

1. What predictions can you make about the rate of transpiration in plants with smaller or fewer leaves?
2. Research 2 plants with differing amounts of stomata and compare that to the environment they are found in (include a water plant).

Part 2: Effects of Environmental Variables on Rate of Transpiration

Procedure

1. Follow the written guidelines in the handout provided
2. Collect data from your photometers using the chart provided (Table 9.1). Be sure to label the table accurately and record the species/type of plant used along with the treatment.
3. After collecting the data, remove just the leaves and calculate surface area in m^2 .
4. Calculate the water loss in mL and then in mL/m^2 for each of your photometers (Table 9.2). This will be a cumulative number.
5. Create a table of all the groups data with species and treatments listed and record total water loss over 30 minutes. Use the table provided for an example of how to set it up (Table 9.3).

Transpiration Lab Rubric

Lab Report Parts	Points Possible	Points Earned
Question Hypothesis (If, then AND order of environmental conditions) Variables: Independent, Dependent, and Control variables, and Constants (1pt each) Materials listed and Procedure write "See lab handout" (2pts)	2 2 6 2	
Part 1 1. What predictions can you make about the rate of transpiration in plants with smaller or fewer leaves? 2. Q2: Research 2 plants with differing amounts of stomata and compare that to the environment they are found in (include a water plant).	3 4	
Part 2 - Data chart for potometer reading table – group data and list name of plant (2 charts for the 2 plants) - Surface area in m ² listed for each plant - Data chart for individual water loss in mL and mL/m ² – group data and list name of plants - Data chart for all environmental data over 30 minutes (from other groups) – room, wind, light, heat, and humidity - Graph of all environmental variables with the single plant species AND your plant of choice: correct orientation of axes, axes labeled with units, appropriate scale for each axes, title, accurate data points for ALL variables	4 2 4 4 14	
Reflection Questions 1. Calculate the rate (amount of water loss per minute per square meter) for each of the factors tested for geraniums: room temp, fan, light, mist, and heat 2. Explain why each of the conditions causes an increase or decrease in transpiration compared with the control a. Effect and explanation for each: room, fan, light, mist, and heat b. Include whether your hypothesis was correct or not 3. Explain the role of water potential in the movement of water from soil through the plant and into the air. 4. What is the advantage of closed stomata to a plant when water is in short supply? What are the disadvantages? How do the guard cells control water loss? 5. Describe 4 adaptations that enable plants to reduce water loss from their leaves. Include both structural and physiological adaptations. 6. Why did you need to calculate leaf surface area in tabulating your results? 7. Compare the results of the geranium to your plant of choice. How do the results differ and what is a possible explanation for the differences? 8. Discuss errors that could have occurred and how that could have impacted your results 9. Pick one of the following questions or a question you came up with and design an experiment to test the question a. Is there a relationship between the number of stomata and the environment in which the plant species evolved? b. Do all parts of the plant transpire? c. Do all plants transpire at the same rate? d. Are leaf surface area and the number of stomata related to the rate of transpiration? e. Is there a relationship between the habitat in which plants live and amount of water loss?	5 11 5 8 4 3 5 4 8	
Total	100	