AP BIOLOGY: TRANSPIRATION LAB

In this laboratory investigation, you will determine the rate of transpiration in plants and then determine the average number of stomata per square millimeter.

PROCEDURE:

1. Remove 2-3 leaves from your plant to use for the stomata peel.
2. Saturate the plant with water.
3. Carefully remove the root ball from the container, keeping all the roots.
4. Cover the root ball with plastic wrap and tie a string around the base so that only the leaves are exposed.
5. DO NOT water your plant any more until the last day.
6. Determine the mass of the plant (initial mass)
7. Place in your environmental condition-
   a. Annual - All Dark
   b. Annual - All Light (lamp)
   c. Succulent - All Dark
   d. Succulent - All Light (lamp)
8. Mass your plant every 24 hours for 4 days. Record your data in the chart below.

Stomata Peel:

1. Using your leaves from step #1 above, paint a patch of clear nail polish on the leaf surface.
2. Allow the nail polish to dry.
3. Press a clear piece of tape to the dried nail polish. Gently peel the nail polish off the leaf. This is the leaf impression that you will examine.
4. Place your impression on a microscope slide and examine under a microscope to at least 400X.
5. Count all the stomata in one microscope field. Repeat counts for at least 2 other fields and obtain an average.
6. After 4 days, we will determine if the number of stomata in the leaf affected the rate of transpiration.

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<tr>
<th>Mass Each Day:</th>
<th>Annual</th>
<th>Succulent</th>
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<tbody>
<tr>
<td></td>
<td>All Dark</td>
<td>All Light (lamp)</td>
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<td>0</td>
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<td>4</td>
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<td>Average number of stomata in a leaf</td>
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Analysis questions
1. What were the various conditions being tested?
2. What was the %change in mass for each condition for each day? \((\text{Day}_x - \text{Day}_0)/\text{Day}_0\)
3. Graph the data collected. Compare the percent change to Days. Use a line for each condition.
4. According to the data which condition transpired the most, predict the reason.
5. Which condition transpired the least, predict the reason?
6. Identify the dependent variable, independent variable, and experimental groups.
7. What was the control?
8. What were sources of scientific error?

Conclusion: Write a conclusion describing the processes of transpiration and bulk flow. What are the different organs and tissues involved? What relationship is there between stomata and transpiration? How do these processes work towards maintaining homeostasis? Be sure to include water potential in your description. Also include a paragraph explaining what you learn in this lab and what “AP Biology Big Ideas” the lab related to. Lastly, answer the following: “If you wanted to transplant a tree, would you choose to move the tree in the winter, when it doesn’t possess any leaves but it’s cold outside, or during the summer, when the tree has leaves and it’s warm and sunny?” and explain your answer using evidence from the lab.