**Pre-Lab Assignment: Ecophysiology II**

**Reading**

1. Review in your textbook if needed: how stomata help regulate the rate of transpiration. You may need to review concepts related to photosynthesis in your textbook as well.
2. Read the pre-lab reading in your lab manual before you answer the following questions.

The density of leaf stomata may vary under different environmental conditions. Prior to the laboratory class, you should develop a question and hypotheses to explore why leaf stomata density may vary, design a data table to record data and develop a data analysis plan. During lab, each member of your group will present their question, hypotheses, and experimental plan. As a group, you will evaluate the merits and pitfalls involved with each plan in order to agree upon a common question and experimental approach to carry out. In order to prepare you to conduct your own experiments, please complete the following assignment in your lab notebook and come to class prepared to present your experimental design:

1. Develop a testable question concerning leaf stomata density. This will involve some kind of comparison (e.g., between plant types, leaf morphologies, environmental conditions…etc.). You may find it helpful to take walk around campus or your neighborhood to generate ideas, after reading in your textbook.

What is the effect of location of leaves relative to the stem on leaf stomata density?

1. Formulate null and alternative hypotheses for this experiment that clearly express claims that can be evaluated through the experiment.

Null Hypothesis: There is no significant difference in leaf stomata density in location of leaves relative to the stem.

Alternative hypothesis: There farther the leaf is from the stem the higher the leaf stomata density.

1. Given the methodology described in your lab manual to count leaf stomata density, describe the kind of data you would collect to evaluate your hypotheses, and how you would analyze (which statistical test & why) and interpret your data in light of your hypotheses. Since you will not be measuring sunlight or water availability you should use caution in how you word your acceptance or rejection of your hypothesis.

The data collected will be the leaf stomata density and the statistical test used will be ANOVA with the Tukey-Kramer test. Depending on the results we will find which distances are significantly different if there are any.

1. Create a table to record this data.

|  |  |
| --- | --- |
| Distance | Leaf Stomata Density |
|  |  |
|  |  |
|  |  |

When designing your experiment, consider that the following tools and equipment will be available to you in class:

* Leaf samples that you collect on campus with your group members during lab class
* Compound microscopes and microscope stage micrometer to determine field of view
* Clear nail polish
* Clear packing tape
* Slides
* Scissors
* Pens
* Prepared slides of leaves to learn to identify stomata

**Rubric for pre-lab**

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| --- | --- | --- | --- |
| **Component** | **Needs improvement (0 pt)** | **Progressing (1 pt)** | **Meets expectations (2 pt)** |
| *Develop a testable question concerning stomata density involving a comparison.* | No question is described. | A question is described but there is no clear comparison. | A question is described that involves a clearly stated comparison. |
| *Formulate null and alternative hypotheses that can be clearly evaluated through the experiment.* | No hypotheses are described. | Contains one problem: only one hypothesis (null or alternative) is described; or the hypotheses described cannot be evaluated through the experiment. | Null and alternative hypotheses are described for both experiments. Hypotheses clearly express claims to be evaluated through the experiment. |
| *Describe what data you would collect to evaluate your hypotheses; how you plan to statistically analyze this data; and how you will interpret your data to evaluate your hypotheses.* | Contains one or more of the following problems: no explanation of data that will be collected; no statistical analysis is stated; no explanation of interpreting the data and evaluating the hypotheses is provided. | The data to be collected is described, but either the proposed statistical test is inappropriate for the data type, or there is no explanation connecting data interpretation to evaluation of hypotheses. | The data to be collected is described, and the proposed statistical test is appropriate for the data type, and there is an explanation connecting data interpretation to evaluation of hypotheses. |
| *Create a table to record this data.* | Contains one problem: no table is provided; or table is neither clearly labeled nor appropriate for data type. | Table is either: not clearly labeled or is not appropriate for the data type. | Table is clearly labeled and is appropriate for data type. |