

# Exercise 6: Light-Induced plasticity data collection

Biol 1012, S2008, Lee and Little

## Procedure

1. For each plant on which you are collecting data, harvest the leaf blade of the youngest fully expanded leaf. Carefully remove the petiole.
2. Weigh each leaf and record the weight (Table 1).
3. Because paper is uniform with respect to weight per unit of area, it is possible to determine the area of a leaf by weighing a piece of paper the same size and shape as the leaf.
  - Flatten the leaf and trace its outline onto a piece of paper.
  - Carefully cut out a piece of paper with the same area as the leaf by cutting along the leaf outline.
  - Weight each piece of paper (g).
  - Weigh a piece of paper of known area such as 1 cm x 1 cm – this will give you the weight of 1 cm<sup>2</sup>. If this is too light for the scale, increase the paper size and calculate weight per cm<sup>2</sup>.

Record the paper area and weight here: \_\_\_\_\_

- How can you use this information to calculate the leaf area? Calculate the area of each leaf and record in Table 1.
4. Calculate specific leaf area (SLA, cm<sup>2</sup>/g) by dividing the leaf area by the leaf weight and record this in Table 1. SLA is an indicator of the thickness of the leaf. The higher the SLA, the thinner the leaf.
  5. Make impressions of the lower epidermis of each leaf using clear nail polish and tape. (This will be demonstrated for you.) View the impressions under a microscope. Determine the number of stomata per field of view, and record these data in Table 2. The diameter of the field of view at 40X objective (400X total magnification) is 0.4 mm, so the area is approximately 0.126 mm<sup>2</sup>. Calculate the stomatal density (#/mm<sup>2</sup>) and enter it into Table 2.
  6. Measure your final choice variable using the procedures you decided on during discussion. Enter these data into Table 3.

## Data Tables

Enter your data in each of the tables below as well as on the master data sheet at the front of the room. We will be analyzing all the data collected in your section for this experiment, so you will receive a copy of the Excel file by email.

**Table 1.** Specific leaf area for *Raphanus sativus* under \_\_\_\_\_ conditions. SLA = specific leaf area.

Sample	Leaf area (cm <sup>2</sup> )	Leaf weight (g)	SLA (cm <sup>2</sup> g <sup>-1</sup> )
1			
2			
3			
4			

**Table 2.** Stomatal density for *R. sativus* under \_\_\_\_\_ conditions.

Sample	Stomata (# in field of view)	Stomatal density (#/mm <sup>2</sup> )
1		
2		
3		
4		

**Table 3.** \_\_\_\_\_ for *R. sativus* under \_\_\_\_\_ conditions.

Sample		
1		
2		
3		
4		

### Specific Lab Report Instructions

#### Your results section should include:

- Three bar graphs (one for each variable) with 95% confidence intervals comparing the means of the two different conditions.
- A single table consisting of the means (plus standard deviations) of light, means (plus standard deviations) of shade, t-values, and p-values for comparisons between conditions for all three dependent variables.
- Text describing important trends, and whether results were significantly different based upon the t-test and 95% confidence intervals.

**A COMPLETE ROUGH DRAFT OF YOUR ENTIRE LAB REPORT IS DUE NEXT WEEK IN DISCUSSION**

#### Also due in discussion next week:

Read the article available on the course webpage lab schedule by Gratani et al. (2006), and answer the following questions. Failure to answer the questions may result in a point penalty on your final report.

1. What were two measurements that we did that the authors of the study also did? What were two aspects that they investigated, but we did not?
2. What did the authors discover about SLA in sun vs. shade leaves?
3. What did the authors discover about stomatal density in sun vs. shade leaves?
4. On page 555 in the discussion section, the authors state that sun leaves contained more nitrogen than shade leaves. How do they explain this?
5. Also in the discussion, the authors discuss water potential in sun vs. shade leaves. What did they find, and does this make sense with what you learned in class?
6. How do the authors explain the difference in SLA between sun and shade leaves?
7. What do the authors suggest is the significance of their investigation in to leaf plasticity?