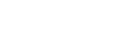


Student Worksheet #3: Advanced Data Sheet

Group ID letter: _____ Names of students in group: Grade Level: _____ Date(s): _____	Plot Location: (Describe location below and then draw a map on the back of this data sheet) Address: City/Town: County:	Describe today's weather: Growing season weather:
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					THESE COLUMNS REFER TO THE LEAF YOU COLLECT FROM EACH PLANT					
Plant ID #	Plant Height (in cm)	Total # of Leaves	Number of Ozone Injured Leaves	% Ozone Injured Leaves	Leaf location code: 1=top third 2=middle third 3=bottom third	% Leaf Area Injured by Ozone: 0 = no injury, 1 = ≤15 %, 2 = 16-50 %, 3 = >50 %	Location of ozone injury on leaf? Color in the area on the leaf below.	% Leaf area affected by Other Injury (discoloration, diseased or insect chewing)	Monarch Butterfly (Stage and number)	# of Seed Pods
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

Field Notes:

Procedure

Equipment: Data Sheet, pencil, fine-point permanent marker, clipboard, extra paper

1. Draw a map showing the location of the study area on the back of the data sheet. Show features near the site like roads, trails, signs and buildings that would allow a person to find the site.
2. Complete the information at the top of the data sheet. Your teacher will give you a "group ID letter" for your group.
3. Fill out the data sheet as follows:
 - a. Select your first milkweed plant. Make sure it has only one main stem, and that it has at least 10 mature leaves (mature leaf = 5-10 centimeters in length).
 - b. Measure and record the height of the stem from base to top in centimeters.
 - c. Count and record the total number of leaves on the plant.
 - d. Examine the leaves carefully with a hand lens. Is there ozone injury? Use the hints at the top of Student Sheet #1 if you need help deciding. Count and record the number of leaves showing ozone injury on the plant (there may not be any). Evaluate only mature leaves of at least 5-10 centimeters in length.
 - e. Calculate the percentage (%) of ozone injured leaves per plant (use the total # of leaves and the total # of ozone injured leaves for this calculation).
 - f. Collect and press a sample leaf from each plant. Try to collect an ozone injured leaf. If no leaves are ozone injured, select any leaf. Write each leaf's ID # directly on it in small letters with your permanent soft-tip pen. The leaf ID # is your group letter plus the Plant ID#. For example, if your Group ID letter is **A**, and the leaf came from plant #5, then the leaf ID # is **A5**. Your teacher will collect the leaves at the end of the lab for pressing and drying.
 - g. For each leaf collected, record the leaf's growing location on the stem.
 - h. For each leaf collected, record what percentage of the leaf area that you estimate is covered by ozone injury (stipples), using the code below. Try to select leaves that show a variety of ozone injury. Many plants may have no ozone injury. Avoid leaves that are more than 10% missing due to insect chewing, disease or other non-ozone injury. If you're having trouble, ask your teacher to show you the laminated leaves or photos again.

Code for recording % of leaf area injured:

 - 0 = no visible signs of injury
 - 1 = very light to light (1-15%)
 - 2 = moderate to moderately heavy (16-50%)
 - 3 = heavy (> 50%)
 - i. If the leaf you collected has ozone injury, record the location of the ozone injury by coloring it on the leaf drawing on the chart. The drawing shows the top of the leaf, with the leaf stem to the left.

- j. For the leaf you collected, record your estimated percentage of the total leaf area affected by non-ozone injury (discoloration, disease, insect chewing, etc.).
 - k. When you finish evaluating the leaf, put it inside a book or plant press to protect it.
 - l. Record the presence of monarch butterflies and the developmental stage (the number of larvae, chrysalis or butterflies on each plant).
 - m. Record the number of seed pods per plant.
 - n. Feel free to record observations you find interesting at the bottom portion of the data sheet, labeled "Field Notes." For example record the size of leaves, whether there are aphids, other types of damage, the health of the plants, weather, etc. Plants heavily infested with aphids may develop a black sooty mold on the upper surface of the lower leaves. This makes finding ozone injury difficult.
 - o. Proceed to the next selected plant and follow this procedure until 10 plants have been evaluated. Each of the plants you evaluate should be 5 feet from each other, if possible.
4. Complete the Student Worksheet #3: Analysis. Your teacher will collect this at the end of the lab.