Part 1 – Primary Productivity in plants

Pre-lab questions

1. The economy of a business or household is somewhat like the energetics of a biological community. A well-run household or business creates a budget based on a careful accounting of money coming in and money going out. Likewise, the energy dynamics of a biological community can be modeled by accounting for the energy coming in and going out through different members of the community. Keeping track of money is relatively straightforward — you count it. You count how much money is coming in and how much is going to various expenses and savings.
How do you keep track of energy in living organisms? It is a challenge. Producers capture light energy and convert it into chemical energy stored in energy-rich molecules. these molecules have mass, so the energy in biological systems can be indirectly measured by mass — biomass. With your lab team, take a moment to brainstorm how you can account for energy use and, in a biological community, transfer it in a manner similar to the ways in which people account for money.

2. As a lab team, discuss the care and maintenance of the organisms you use in this lab. Prepare a schedule and divide up responsibilities for long-term care and maintenance. (this includes taking care of animal wastes.) Check out online information on care and maintenance of the organisms you and your teacher select for this investigation.

3. In your lab notebook, design and construct a systems diagram to model energy capture and flow through a plant. Use annotations to help explain your reasoning. Before taking any measurements, think about the input and output of energy in a plant. For instance, what do you predict about the quantity of energy the plants take in compared to the quantity of energy that goes out? What do you think are various ways that a plant (or a number of plants) could lose energy, and how could you estimate the amount of energy lost through these various pathways? Enter your predictions in your lab notebook by constructing an annotated system diagram, such as Figure 2, of the flow of energy into and out of a plant.

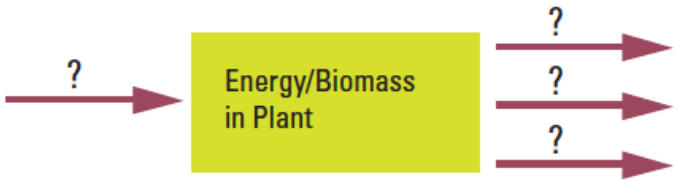


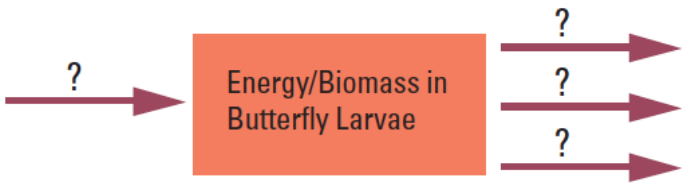
Figure 2. Energy Flow into and out of a Plant

4. Use your energy diagram to design your lab investigation. In your lab notebook include your question, hypothesis and procedure.

5. Answer the pre-lab questions in your lab notebook

Guided inquiry part 2 – Butterfly larva

1. Read the procedure for part 2 – write a hypothesis about what you think will happen to the mass and energy content in your cup of larva over the next few weeks
2. Draw and describe the life cycle of the painted lady butterfly
3. In your lab notebook, develop a system diagram, such as Figure 3, to model energy flow from Fast Plants to cabbage butterfly larvae. Before taking any measurements, predict the input and the output of energy in the butterfly larvae you will be growing. Enter these predictions in your lab notebook.



**Create data tables for EACH part of the lab BEFORE you begin. The biggest challenge in this lab is keeping track of ALL the data correctly.