Timing Lab

Objectives

To learn about timing of presentation and ripening of the sexes of flowers, observe differences in pollination receptiveness throughout the day, and, where possible, observe patterns/differences in pollinator visitation times.

Topics Addressed

Flower morphology/reproduction, competition

Background

Many flowering plants attract several species of pollinators. These can then compete among each other and this competition can limit the amount of resources (pollen/nectar) that the less aggressive competitors get from the flowers (in some cases, local populations can become extinct). Due to their abundance and aggressive behavior, some pollinators such as honeybees, can outcompete native pollinators. One widespread strategy among animal species is to avoid direct contact with their competitors by foraging for food at times of the day (or the growing season) when the most efficient and aggressive competitors are not active (this is called temporal niche partitioning).

Students can observe competitive interactions among pollinators and determine whether native pollinators are foraging at the same times as honeybees (which is an introduced species and very good competitor)

Background Questions

1. Explain why honeybees can be both beneficial and harmful to local ecosystems.

2. Why is it important to have multiple species of pollinators, not just honeybees, in an ecosystem?

Hypothesis
Do you think the time of day has an impact on the pollinators visiting the flower? Explain why.

Procedure:

1. In the garden, take a few minutes to locate a flower that is being visited by pollinators (or, if your teacher has already identified the plants for study, go to one of the pre-selected flowers). Record the plant species on the data sheet.

2. For 15 minutes, record how many honeybees and other pollinators visit the flower. A visit is defined as a bee landing on the flower, not just flying near it. On your data sheet, also make note of what species visit the flower, and any behavioral observations (for example, did pollinators share the flower? Did one leave as soon as another got close?)

3. Repeat the procedure at three different times of day, preferably at least 2 hours apart.

Analysis Questions

1. Did the time of day have an impact on the type of pollinators visiting the flower? Explain *why* you think you got this result. Was your hypothesis correct?

2. Compare your results to other people that observed different species of flowers. Did they get the same results, or were the results different depending on the type of flower. Explain.

3. Did the time of day affect the total number of visits to the flower? What are some reasons that pollinators visit flowers at different times?

4. What kind of interactions did you observe between pollinators? Was one type of pollinator dominant over the others?

5. What time of day do flowers produce the most nectar? (You can look this up)

6. Why don't all pollinators feed at this time of day?

Teacher Notes

- This project quires visiting plants/garden at different times of the day, which might require out-of-class meetings or assignments. Another way of solving this is to have different class periods that meet at different times collect data on the same flowers, then share the data.

- If resources are available, you might set up a camera to monitor changes over the course of several days and playing the video feed back during class for discussion. Ideally, you would observe flowers in early morning, late morning, and afternoon.

- When starting the lab, you can choose to let the students select their own flowers, or set up stations with specific species that you want them to observe. It is important that they use the same flower (not just the same species) when they are doing the subsequent observations.

Timing Lab Data Sheet

Start time	End time	Plant species	Honeybee visits	Other pollinator visits	Pollinator species (if known)	Behavior notes

Graph

Use the back of this sheet to graph your data. Your graph should show number of honeybees vs. other pollinators as a function of time of day. Be sure to include a title, a key, and label your X and Y axis.