



Vocabulary

- **Aphids:** tiny soft-bodied insects of the family Aphididae that suck the sap from stems and leaves of various plants
- **Beneficial Insects:** insects that provide valuable services to plants such as pollination and preying upon pest insects
- **Biodiversity:** diversity among and within plant and animal species within an environment
- **Biodiversity Index:** a measure that reflects how many different types of species are in a dataset
- **Ecosystem:** a system formed by the interaction of a community of organisms within their environment
- **Garden pests:** insects which harm crops, humans, and ecosystems
- **Integrated Pest Management (IPM):** an approach to controlling pests which considers all available pest control techniques
- **Larva:** the immature, wingless, feeding stage of an insect undergoing complete metamorphosis
- **Plot Sampling:** a method for measuring a large forested area without having to measure each individual tree
- **Species:** the major subdivision of a genus or subgenus, composed of related individuals that resemble one another
- **Syrphid Fly:** also known as a Hoverfly, a beneficial insect which only feeds on other insects during its larval stage

At the end of this lesson, students will be able to:

- Identify beneficial insects vs. pests
- Perform random sampling measurements
- Connect issues of biodiversity in the garden to a wider ecological landscape
- Briefly explain the practice of Integrated Pest Management
- Encourage biodiversity in the class/school garden (if applicable)

National Education Standards:

- NSTA National Science Education Standards (9-12)
 - [LS2.A: Interdependent Relationships in Ecosystems](#)
 - [LS4.D: Biodiversity and Humans](#)

What you'll find in this packet:

- Step-by-step Activity Guide
- Pre- and Post-Activity discussion ideas
- Background information on garden diversity & beneficial insect-attracting plants
- Observation Data Sheet

What you'll need:

- A hula hoop for each group
- Magnifying glasses (optional)
- Observation Data Sheet (provided)

Teacher Preparation

- Schedule a field trip or excursion to a green space or garden
 - If you have a school garden, this would be a great activity for observing its biodiversity. Just be sure not to damage the plants with the hula hoop!
- Be sure the chosen green space is free of hazardous materials (i.e. poison ivy, fire ants, etc.).
- Assign students into groups of 3 or 4.



Pre-Activity Discussion:

- What is biodiversity? How can we measure it?
 - Explain “Plot Study” and “Plot Sampling.”
- Why might we want to encourage biodiversity in a garden setting?
 - What is a beneficial insect?
 - Syrphid fly can be used as an example as well as native bees
- Ask students what they know about the green space where the activity will occur.
 - Have students develop hypotheses about what plants and insects might be found there.

Activity Procedure:

- Upon arrival at the site, assign student groups to different areas in order to cover as much ground as possible.
- Instruct students to either toss or place their hula hoop inside their assigned area.
- Have students observe both what they find on the ground and above ground (i.e. plants and anything on the plants) within the hoop.
- Students will observe what forms of life are found inside the hula hoop.
 - This can include plant matter, insects, eggs, animal signs, fungi, etc.
 - If there are plants, are they flowering?
- Encourage students to take photos of plants and insects they find for later identification.
- Students should also observe the temperature and amount of sun or shade in their area.
- All observations should be recorded by each group member on a Data Sheet.
- Once students have recorded their data, they should move to one more location and make the same observations there.
- Once back in the classroom, student groups should determine the average number of plants and animals in their plot samples. Graphically represent these findings and present to class.
- Calculate the class-wide average of plants and animals that were observed. A representative from each group should collaborate on a class-wide graphic representation of the data.

Post-Activity Discussion:

- Which areas were the most diverse?
- Were any of the insects found in the plot sampling beneficial to the health of the vegetative materials? Could you identify any beneficial insects or pests?
- Were there plants that seemed resistant to insects? Were there any that seemed to attract them (i.e. lots of pollinators were found on the flowers/leaves)?
- How can we increase biodiversity in the green space or garden?



Introduction:

Diversity in the garden is not only aesthetically pleasing but can also lead to an overall healthier garden.

A variety of plants attract a variety of insects. Some insects that are referred to as pests cause damage to plants and are therefore undesirable in the garden. Other insects are beneficial to plants like those which aid in pollination and those that are natural enemies to insect pests in the garden. Helpful insects are often called beneficial insects.

Some beneficial insects are only a threat to a specific pest during certain stages of their life cycle. One example is the syrphid fly. Syrphids only feed upon their prey (including common garden pests such as aphids and mealy bugs) while in their larval stage. Adult syrphids don't eat other insects; they only eat nectar and pollen.

It is helpful to provide a variety of nectar and pollen sources in your garden so that they can support beneficial insects during all their life stages.

Plant families that are known to attract and sustain beneficial insects include:

Apiaceae (Parsley Family)

Angelica (*Angelica*)
Anise (*Pimpinella anisum*)
Wild Carrot (*Daucus carota*)
Cilantro (*Coriandrum sativum*)
Cumin (*Cuminum cyminum*)
Dill (*Anethum graveolens*)
Parsley (*Petroselinum crispum*)

Lamiaceae (Mint Family)

Basil (*Ocimum basilicum*)
Calamint (*Calamintha*)
Coleus (*Solenostemon*)
Lavender (*Lavandula*)
Oregano (*Origanum vulgare*)
Rosemary (*Rosmarinus officinalis*)
Garden Sage (*Salvia nemorosa*)
Thyme (*Thymus*)

Asteraceae (Daisy Family)

Aster (*Aster*)
Cone Flowers (*Echinacea*)
Dandelion (*Taraxacum*)
Marigolds (*Tagetes*)
Mums (*Chrysanthemum*)
Tickseed (*Coreopsis*)
Wormwood (*Artemisia*)

Brassicaceae (Cabbage Family)

Sweet Allysum (*Lobularia maritime*)
Broccoli (*Brassica oleracea*)
Candytuft (*Iberis*)



Biodiversity Observation Data Sheet

Describe this location: Garden Wetland Forested Grassland Other: _____

This location is: Sunny Shady Part Shade/Sun

The temperature is: Warm Cool

Number of Insects:

Any Insects you can identify:

Number of Insect Eggs:

Number of Plants (including weeds):

Any Plants you can identify:

Number of Fungi:

Any Fungi you can identify:

Signs of animal or insect activity (i.e. footprints, eggs, bite marks/holes, etc.):

Use this space to describe any other observations you make in this plot sample: