



University of Kentucky Department of Entomology Insects in the Classroom - Lesson Plan **BENEFICIAL BUG SCAVENGER HUNT**

For Middle School (grades 6-8)
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Developed from an activity designed by Dr. Ric Bessin

Activity Description

Field investigation of beneficial insects and spiders

For Kentucky Middle School Science Curriculums, Grades 6-8

Time: 1 hour for outdoor observation, 5 minutes for each student to present, plus time for discussions and conclusions

Materials needed: pencil and paper

Comment: this activity is best conducted outdoors in late spring, summer, or early fall

Objectives

- ❖ **Students will investigate the ecological role of beneficial insects and spiders, including predators and pollinators.**
- ❖ **Students will search an outdoor environment and record types of beneficial insects and spiders that they discover.**
- ❖ **Students will closely observe one beneficial insect or spider and write a brief description detailing the behavior of the creature, where it was found, and how it interacted with other organisms**
- ❖ **Students will present their observations to the class.**
- ❖ **Students will discuss the ways that the insects and spiders that they observed function in their ecosystem.**

Academic Expectations

The above objectives fall under KERA's Science Academic Expectations:

2.3 Identify and analyze systems and the ways their components work together or affect each other.

Program of Studies

S-6-LS-3 Observe populations and determine the functions (e.g. decomposers, producers, consumers) they serve in an ecosystem.

S-8-LS-4 Investigate and analyze populations and ecosystems.

Core Content

SC-M-3.5.2 Populations of organisms can be characterized by the function they serve in an ecosystem. Plants and some microorganisms are producers because they make their own food. All animals, including humans, are consumers, and obtain their food by eating other organisms. Decomposers, primarily bacteria and fungi, are consumers that use waste materials and dead organisms for food. Food webs identify the relationships among producers, consumers, and decomposers in an ecosystem.

BENEFICIAL BUG HUNT

Lots of insects are pests. They bite us and eat our crops. So it's easy to forget that some insects help us, too. Predatory insects and spiders are nature's insecticides, keeping pest

species at low numbers. In addition, many of our world's flowers wouldn't exist without bees, flies, and butterflies to pollinate them.

Throughout the spring, summer, and fall in Kentucky, outdoor gardens and flower patches are great places to find beneficial insects. If your school has a small garden, or if you can arrange a field trip to a public garden or arboretum, you can introduce students to some of these "good guy" insects.

For this field investigation, all you need to do is familiarize your students with a few common beneficial insects, and then let them start searching. Despite what your students may think, it is not hard to learn how to identify a few of the most common types of beneficial insects. Everyone knows what praying mantids, wasps, and lady beetles look like. Bees, flies, and butterflies are also easy to recognize. If you have a field guide to insects, you can show students pictures of some of the not-so-well-known beneficial insects, such as green lacewings and assassin bugs. Attached is a sheet with pictures of most of these insects that you can distribute to your students, and will be especially useful if you have a color printer, but can also be used in black and white.

Allow students to observe outdoors for 30 minutes to 1 hour, or more if you have time. Encourage students to note and describe insect predators or pollinators that *aren't* on the list. With a little research, they can probably figure out what these insects are.

During the bug hunt, make sure that each student becomes the "expert" on one type of insect or spider on the list by filling out the "You are the Expert" sheet. Try to ensure that different students become experts on different insects and spiders (so that all the students don't pick "praying mantid," for instance).

Essential question for this activity: "What are some of the adaptations that beneficial insects and spiders use to serve their ecological roles?"

PRESENTATIONS and DISCUSSION: After each student has made observations and become an expert on one type of creature, have each student present his or her findings to the rest of the class. After these presentations, have the class discuss predators and pollinators. In particular, the students may want to discuss:

- what did the predators have in common? what were the differences?
- what did the pollinators have in common? what were the differences?
- were any of the pollinators fed upon by predators?
- did anyone observe an insect that appeared to act both as predators AND pollinators (this may be true for some wasps and ants, for instance)?

Below are some basic facts about each kind of beneficial arthropod. Use this info as ammunition to keep the discussion going as students talk about their observations.

PRAYING MANTIDS: There are three species of praying mantids that occur in Kentucky. The largest is the Chinese Mantid, which can be nearly 4 inches long. Praying mantids catch victims in their front legs and devour their prey with chewing mouthparts. Praying mantids are also excellent jumpers. They can fly too, but they don't fly very often.

LADY BEETLES: Lady Beetles, also called "ladybugs," are common garden predators. They specialize in aphid control. There are several species of lady beetles in Kentucky. Some of them are shiny and black, but most of them are red with black spots. Baby lady beetles are also predators. They don't look very much like beetles, though. Immature lady beetles look like caterpillars, and they have to go through a pupal stage (just like butterflies and moths) before they become adults.

GREEN LACEWINGS: Although many people aren't familiar with green lacewings, they are very common in Kentucky. They look a bit like small green dragonflies, but they are more closely related to beetles. Like lady beetles, adult and immature green lacewings like to eat aphids. Also like lady beetles, baby green lacewings resemble caterpillars go through a pupal stage before becoming adults. There is also a Brown Lacewing that is common in Kentucky. It is slightly smaller than the green lacewing.

WASPS and ANTS: Wasps are known for their painful stings, but they are also very helpful. Most wasps are predators. They feed on caterpillars and other pests. Some wasps are "parasitoids." Parasitoid wasps lay their eggs inside caterpillars, where the larval wasps develop, eventually killing the host. Parasitoid wasps are important pest control agents in many crops. Many people don't realize that ants are types of wasps. Many kinds of ants prey on pest insects.

ASSASSIN BUGS: Assassin bugs aren't as well known as praying mantids, but they are just as fascinating, and just as voracious. Instead of chewing their prey, assassin bugs use their tube-like mouthparts to suck juices from their victims. They are also better fliers than praying mantids. The "wheel bug" is one of our largest and most common assassin bugs. It has a large structure on its back that resembles a wheel. Many assassin bugs are able to bite people, so watch out!

SPIDERS: There are many different kinds of spiders. They come in lots of colors and shapes, but they have one thing in common: they are all predators. Spiders have venomous fangs that they use to subdue their prey. Most spiders aren't dangerous to people, though. Although many spiders make webs to catch prey, some, like wolf spiders, are active hunters that search the ground for food.

POLLINATORS: Many bee, fly, butterfly, and moth species are important pollinators. They are drawn to the bright colors of flowers where they feed on nectar. As these insects feed, they transfer pollen from flower to flower. This allows the plants to reproduce. Pollinator insects often have furry bodies that allow them to pick up lots of pollen. Many bees and flies are also able to hover, just like hummingbirds. This lets them remain in flight while feeding on nectar. Many pollinators also have long tongues that allow them to probe deep inside flowers for nectar. Scientists believe that bright, colorful flowers and pollinator

insects evolved together. That means that if there were no pollinating insects, there might not be any flowers.

Some resources that may help you and your students:

1. **National Audubon Society Field Guide to North American Insects and Spider** by Milne and Milne
2. **Spiders and Their Kin (A Golden Guide)** by H. Levi and L. Levi
3. **University of Kentucky Critter Files** (online guide to Kentucky insects and spiders): <http://www.uky.edu/Agriculture/CritterFiles/casefile/casefile.htm>

(student handout) **BENEFICIAL BUG SCAVENGER HUNT**

NAME _____

BUG HUNT TALLY (20 points) Find as many different kinds of beneficial insects and spiders listed below that you can. Below the name of each type of creature, place a check mark if you find one (you may not see each kind). In the “observations” section, record what the creature was doing, where it was, and how it was interacting with other creatures.

PREDATOR	Observations
PRAYING MANTID	
LADY BEETLE	
GREEN LACEWING	
WASPS and ANTS	
ASSASSIN BUG	
SPIDER	

POLLINATOR	Observations
BEE	
FLY	
BUTTERFLY/MOTH	

(student handout) **BENEFICIAL BUG SCAVENGER HUNT**

NAME _____

YOU ARE THE EXPERT (40 points):

Become an expert on a predator or pollinator: pick one insect or spider that you liked the most, or that you spent the most time observing, and answer the following questions. Use this information to make a brief presentation on your creature after the bug hunt.

1. Type of insect or spider _____ predator pollinator

2. Where was your insect or spider when you observed it?

3. Describe your creature's movement. Was it flying? Crawling? Sitting still?

4. Did you observe your creature in the act of predation/pollination? Y N

5. Describe any interaction that your creature had with other organisms. Was your organism eating or being eaten? (remember: plants are organisms too!)

(student handout) **BENEFICIAL BUG SCAVENGER HUNT**

NAME _____

6. Use the internet or insect field guide to learn what kind of prey your creature prefers (if it is a predator) or what kind of flowers it likes to visit (if it is a pollinator).

7. Describe at least 2 adaptations (structures and behaviors) that your insect or spider uses to fulfill it's ecological role.

8. Did you observe or find out anything else interesting about your insect or spider?



PRAYING MANTID



LADY BEETLE



LADY BEETLE



GREEN LACEWING



PAPER WASP



POTTER WASP



ASSASSIN BUG



CRAB SPIDER