

Marshall University Sustainability Department

Marshall University
One John Marshall Drive
Huntington, WV 25755
Phone: 304-696-2992
Fax: 304-696-2437
bemarshallgreen@marshall.edu

Garden Wildlife

September, 2016

OBJECTIVES

Students will explore insect mouthparts and food sources through a form and function lab activity. They will infer how insects affect gardens by discussing the benefits and harms of garden “friends and foes”. Students will learn how to identify such critters in a garden then apply these skills in the garden.

LESSON PARAMETERS

1. **Key Terms** - form, function, garden friend and foes, natural repellants
2. **Group Size** - groups of 3 to 5 students; applicable for a class ranging from 3 to 30 students
3. **Grade Levels** - 3rd- 12th
4. **Duration** - one 60 minute session
5. **Setting** - outdoors
6. **Disciplines** - Science, Art, Environmental Education
7. **Learning Techniques** -
 - a. Discussion
 - b. Hands-On
 - c. Group-based Collaboration
 - d. Interdisciplinary
 - e. Critical Thinking
 - f. Activity-based
 - g. Real-world application
 - h. Expeditions
 - i. Nature-based
 - j. Observations



GREEN CONNECTIONS

- **Connections to Home and Community** - Students may connect the knowledge they obtain during this lesson to their own home or community gardens.
- **Sustainable Perspectives** -
 - Gardening
 - Sustainable habitats
 - Sustainable food sources

LESSON SUMMARY

Students will be presented with a variety of “food sources” and “insect mouthparts” without much prior explanation. They must hypothesize which mouthparts would be the best fit for each food source then test them out. This can be done individually, as partners, or in groups (depending on class size and available resources). The students may go through multiple rounds of trial and error until they decide which mouthparts should be used. Then they will record their conclusions and hypothesize which insects have such mouthparts in a table found on pages 16-17 in the Feeding Freezing PDF at <http://cdn.orkin.com/downloads/feeding-frenzy.pdf>.

After this activity, the students and instructor will discuss the conclusions as a whole class. Then the instructor will transition into how such insects may occupy a garden. He/she will ask the students whether they think these insects are “friends or foes”. After discussing their thoughts, students will receive handouts showing beneficial insects, pests, damaged leaves, and plants that help repel pests (from “Getting Rid of Garden Pests”

[\(https://www.fix.com/blog/common-garden-pests-and-how-to-get-rid-of-them/\)](https://www.fix.com/blog/common-garden-pests-and-how-to-get-rid-of-them/)). They will also discuss other friends or foes such as birds, snakes, rabbits, deer, etc. If students have a smartphone, they will be encouraged to download the free Audubon Birds app. This app allows you to see what birds have been spotted at nearby locations.

To conclude the lesson, students will be challenged to find friends or foes in the MU Student garden or any other garden at Marshall. They must search for insects on or around the plants and determine whether it is a friend or foe. They must also search for any damaged plants and determine which critter was the victim of such damage. If any birds are nearby, they can use the app to identify the birds. All of these observations can be done individually, as partners, or in groups (depending on class size). Each identification or observation should be recorded in a journal or notebook. Students may also use their smartphones to take pictures of their observations.

ACTIVATING STRATEGY

The students will be presented with the materials for the insect mouthparts activity. They will be challenged to figure out which mouthparts fit which food sources and which insects contain such mouthparts. This will physically and mentally stimulate students as they learn kinesthetically.

LESSON DEVELOPMENT

<p>Exploration Lesson - Students will explore how form and function are related as they participate in trials and errors of the insect mouthparts activity.</p>	<p>Explanation Lesson - After hypothesizing and testing the various mouthparts, insects, and food sources, students will discuss the collected data then receive accurate information from the instructor and handouts. This will provide further explanations of how form relates to function as well as how to spot such evidence in a garden.</p>	<p>Application Lesson - Having learned how to identify garden “friends or foes”, students will be given the opportunity to apply their new skills at the MU student garden. They will search for critters and signs of critters amongst the plants and record their data.</p>
--	---	--

LESSON ADDITIONS & CONTINGENCY

If time allows, students may continue searching the garden until it is time to leave. If this particular garden has been thoroughly searched, they may move to another location to make observations.

If the weather prevents any outdoor learning this day, the students will be given pictures of insects and damaged leaves to identify. If time allows, they can do further research of garden friends and foes and how to attract or repel them, respectively. If this does not interest the students, they can explore local birds and listen to bird calls from.

(<https://goo.gl/2q1AXu>)

DISCUSSION QUESTIONS

- What critters are beneficial to a garden? Which are bad?
- How do insects feed on a garden?
- How can you tell what critters have been in your garden?
- What kinds of birds are beneficial? (Insect eating, fruit/seed eating)? Slugs? Snakes? Squirrels? Rabbits? Bugs?
- What kinds of bugs?

MATERIALS

Physical Materials

- Cup of water, uncovered
- Cup of water, covered with plastic wrap
- Plate of water
- Paper
- Raisins or any other small food parts
- Scissors
- Drinking straw
- Drinking straw with toothpick attached
- Drinking straw with small sponge attached
- Clothespin

- Handouts from:
 - [Getting Rid of Garden Pests](#)
 - [Feeding Frenzy \(PDF\)](#)

RATIONALES

- **Next Generation Science Standards**

- **MS-LS1-4** - Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.
- **MS-LS1-5** - Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
- **MS-LS2-1** - Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
- **MS-LS2-2** - Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
- **MS-LS2-5** - Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

- **21st Century Science Content Standards and Objectives for WV Schools**

- **SC.O.6.2.05** - examine how abiotic and biotic factors affect the interdependence among organisms.
- **SC.O.6.2.08** - predict changes in populations of organisms due to limiting environmental factors (e.g., food supply, predators, disease, or habitat).
- **SC.O.7.2.07** - evaluate how the different adaptations and life cycles of plants and animals help them to survive in different niches and environments (e.g., inherited and acquired adaptations).
- **SC.O.ENV.2.10** - analyze biological diversity as it relates to the stability of an ecosystem.
- **SC.O.6.1.01** - realize that scientists formulate and test their explanations of nature using observation and experiments.
- **SC.O.6.1.05** - cooperate and collaborate to ask questions, design and conduct investigations to find answers and solve problems.
- **SC.O.6.1.11** - construct and use charts, graphs and tables to organize, display, interpret, analyze and explain data.