Where the GRASS is GREENER

Good Bugs: Groundcover and Beneficial Insects

INTENDED AUDIENCE:

4th-5th graders

TIME: 45 minutes

GROUP SIZE: 5-20 youth

EDUCATIONAL STANDARDS:

- NGSS LS4-1: Make observations of plants and animals to compare the diversity of life in different habitats.
- NGSS LS4-3: Construct an argument with evidence that in a particular habitat, some organisms can survive well, some survive less well, and some cannot survive at all.
- NGSS LS2-1: Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

MATERIALS:

- Outdoor area to collect insects: field, garden, or other area with plants (large grass areas like sports fields may not be best, but a park with grass, bushes, and other plantings would work)

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INTRODUCTION

Perennial groundcover is a cropping system that has year-round groundcover with crops planted in tilled strips. This cropping system offers benefits such as lower costs, weed suppression, reduced soil loss, increased nutrient sequestration, decreased soil carbon loss, and the potential for increased stover removal and higher grain yields. The presence of plants year-round can also increase natural enemies of crop pests and potentially reduce damage to the crop from insect pests.

In this activity, youth will learn about natural enemies and how they benefit crop production. They will collect and identify insects and explore strategies for using natural enemies as pest control.

LEARNING OBJECTIVES

- Explain the concepts of predator, prey, and biocontrol.
- List different types of insects and the characteristics of each.

PREPARATION

1. Print handouts and photos.
2. Select a location with natural plant cover such as a park or field to collect insects, or prepare specimens or printed photos in advance.

As an alternative option, photos or pre-collected specimens could be used if outdoor collection isn't possible or the activity is done during the winter. Insects could also be collected ahead of time and stored in a freezer.

ACTIVITY DIRECTIONS AND DISCUSSION

Have an introductory discussion with participants.

Ask: What is a predator?

Explain as needed that a predator is a living thing that hunts, captures, and eats other living things.

Ask: What is an example of a predator?

Examples might include foxes, wolves, and lions.

- Sweep nets (optional, but an easy way to collect)
- Resealable bags or jars to collect insects
- Handout of common insects
- Other resources for insect identification (optional)

RELATED CAREERS:

- **Entomologist:** Studies insects and their interactions with plants, animals, and ecosystems. Entomologists often work in agriculture, conservation, or public health.
- **Agronomist:** Focuses on crop production and soil management. Agronomists help farmers improve yields while protecting the environment, often using strategies such as perennial groundcover and biological pest control.
- **Conservation Biologist:** Works to protect biodiversity and natural habitats. May study how plant diversity supports insect populations and ecosystem health.
- **Ecologist:** Studies ecosystems and how organisms interact with their environment. Ecologists often conduct field research, like the insect collection activity.

ADDITIONAL RESOURCES:

- Iowa State University Integrated Pest Management YouTube Channel: https://go.iastate.edu/7FTMGO
- Iowa State University Department of Entomology Bug Guide: https://go.iastate.edu/UPRPIJ

Ask: What is prey?

Explain as needed that prey are the living things a certain predator eats.

Ask: For one of the example predators you gave, what are some of its prey?

For the above examples, this would be mice, rabbits, and zebras.

Think about a vegetable garden. Do you think there are any predators in a garden?

Watch this video of a spider eating a beetle: https://go.iastate.edu/K62MPW (Alternatively, look at the photo of insects caught in a spider web.)

Say: In gardens and crop fields, some animals eat insects. This can be very helpful if they eat harmful insects. Some insects are pests that eat the crop plants. Animals that prey on these insect pests, such as spiders, are considered natural enemies of these pests.

Today, we will take a look at some insects that are natural enemies of plant pests.

DO

Collect insects in a natural area (crop field, garden, or park). You may want to use sweep nets or other collecting devices. Bring resealable plastic bags or jars to put insects in so you can get a better look.

Use the handout and other resources to identify any of the predators or pest insects.

If time allows, play a predator-versus-prey tag game. Youth will role-play predator and prey insects, with the "prey" trying to obtain plant food without being eaten (tagged) by a "predator." Predator-versus-prey tag game instructions: https://go.iastate.edu/WXOUWB

REFLECT

Ask youth to pair up with someone nearby. Allow partners to discuss the following reflection questions.

- Did you find any natural enemies from the handout?
- Did you find any pests that the natural enemies might be eating?
- What kinds of insects did you find? Were they different in size, shape, or color?

APPLY

Ask the youth what habitat they think is best for these garden and field predators. As a group, create a list of resources that natural enemies need in their habitat. The list should include food (prey organisms), water, shelter/protection (usually plants), and a place to lay their eggs.

- U.S. Department of Agriculture Natural Resources Conservation Service PLANTS Database: https://go.iastate.edu/R1YV4G
- National Association of County Agricultural Agents Corn Scouting Guide: https://go.iastate.edu/2D5KUD
- Crop Protection Network Crop Scouting Basics for Corn and Soybean: https://go.iastate.edu/T0VP3Y

Look at these two photos (one of a field with conventional tillage and one with perennial groundcover). Which one do you think is better for insect predators? Why? (The photo with plants growing is better for insect predators because it provides shelter and food for prey).

Photo of field with perennial groundcover tillage.

Photo of a field with conventional tillage.

Allow partners 3–5 minutes to discuss the following questions. You can display these on chart paper or read them aloud:

- Have you ever seen insects like the ones we found today in your yard, garden, or neighborhood? What were they doing?
- If you had a garden, what could you do to help protect the helpful insects (natural enemies)?

Bring the group back together and invite a few volunteers to share what they discussed with their partners. Use guiding questions to spark conversation:

- Who has seen a helpful insect in their yard or at school?
- What's one thing you could do to make your garden or yard better for insect predators?

As youth share, highlight connections between their ideas and the key concepts from the activity, such as biodiversity, habitats, and the role of predators in ecosystems.

ASSESSMENT

Have children draw their favorite insect predator. Include its prey, its habitat, and how perennial groundcover can help it survive.

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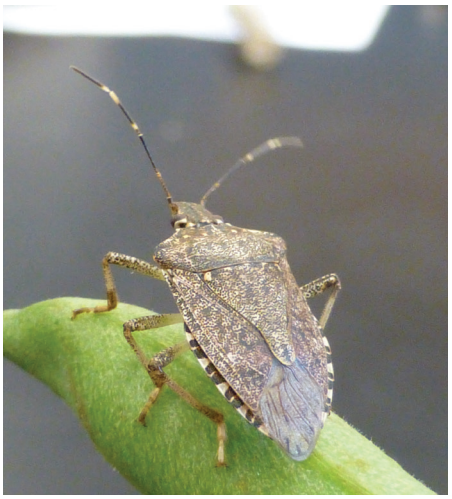
Photo of field with perennial groundcover tillage.

Photo of a field with conventional tillage.

Common Field and Garden Pests

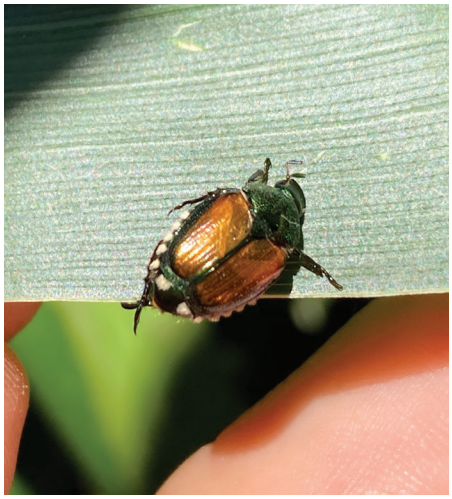
Leaf Hopper

Aphids



Stink Bug

Grasshopper

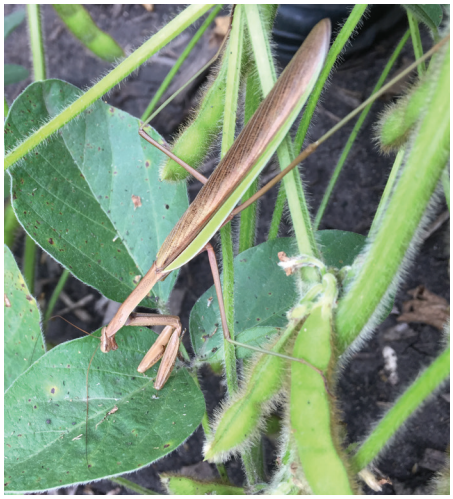


Japanese Beetle

Green Cloverworm

Cucumber Beetle

Common Predator Insects (Beneficial in Fields and Gardens)



Praying Mantis

Green Lacewing

Brown Lacewing

Assassin Bug

Lady Beetle

Common Pollinators (Good for Crops and Gardens)

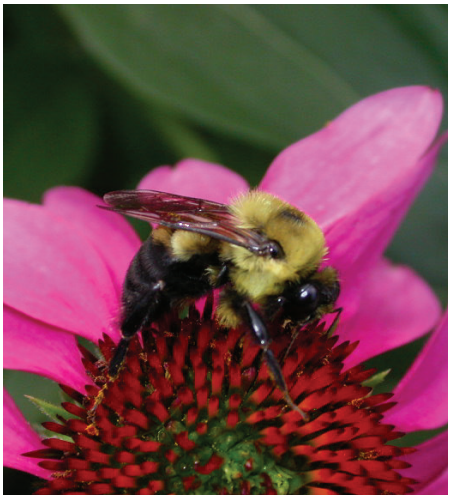
Monarch

Swallowtail

Hawkmoth

Sulphur Butterfly

Mason Bee



Bumblebee