



INSECT TRAP MATERIALS LAB

THEME

- Forest Health
- Ecology
- Plant Conservation

TYPE OF LESSON

- Instructor-Led
- Hands-On
- Garden Exploration

POSSIBLE WAYS TO LEAD LESSON

- Outdoors
- Virtual
- Classroom
 - For a classroom lesson version, visit our website: www.plantheroes.org*
- Other:

TEACHING STRATEGY

- Place-Based Learning
- Storytelling
- Nature Play
- Art / Movement
- Other: Group work; design thinking

STANDARDS

- NGSS, 3-5-ETS1-1. Engineering Design. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- NGSS, 3-5-ETS1-2. Engineering Design. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

GRADES 3–5

DURATION 30 minutes

LESSON GOAL

Learners analyze common materials that could be used to capture insects for study and explain their thinking to the group.

LESSON SUMMARY

Learners will analyze materials and then write about and draw ideas for building traps to capture insects. They will discuss their ideas with the group and read about existing traps scientists use to capture insects.

DIGITAL MATERIALS

- **Trap Design Worksheet** (1 per learner)
- **Insect Information Sheet** (1 per learner)
- **Trap Information Sheet** (1 per learner)

OTHER MATERIALS

- Pencils with erasers (1 per learner)
- Straw (1 per educator)
- Masking tape (1 per educator)
- Funnel (1 per educator)
- Working flashlight (1 per educator)
- Insect net, small fish net, or something similar (1 per educator)
- One or more of the above design items (1 per learner)
- A sheet of paper to write on (1 per learner)



WORD BANK

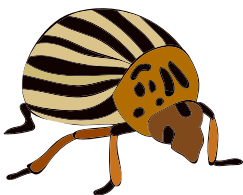
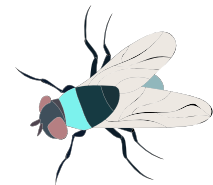
- | | |
|--------------------|---------------------|
| <i>decomposer</i> | <i>pest</i> |
| <i>pollinators</i> | <i>diurnal</i> |
| <i>prey</i> | <i>nocturnal</i> |
| <i>predator</i> | <i>biodiversity</i> |

SETUP

1. Review the **lesson procedure**.
2. Review and consider the optional **pre-** and **post-lesson explorations** and the **extensions**.
3. Get links or copies of the **digital materials** ready to share.
4. Gather the **other materials** on the list. Have at least one of each of the materials on the list ready to share via camera with learners.
5. Send learners a list of materials they should gather ahead of the lesson. They should try to find at least one of the design materials (i.e., a straw, masking tape, a funnel, a flashlight, or a net).

LESSON PROCEDURE

1. Optional: Complete one or more of the **pre-lesson explorations**.
2. Share the **lesson opener**.
3. Share digital copies of the **Trap Design Worksheet** and the **Insect Information Sheet**.
4. Share your screen showing the **Trap Design Worksheet**. Allow learners a few minutes to write their answers to Question 1 on a blank piece of paper.
Optional: If learners were successful in bringing one of the trap design items to the lesson, have them think about what insects that item might help them trap.
5. Brainstorm as a group on Question 2, but then let learners work individually on Questions 3 and 4. Let them know they can ask questions or discuss with one another if they want to.
6. You can play music in the background while they work.
7. Ask the **lesson questions**.
8. Share examples of insect traps used by entomologists.
9. After discussing the group's ideas and their recommendations, share the **Trap Information Sheet** showing what scientists currently use as traps.
10. Optional: Complete one or more of the **post-lesson explorations**.



LESSON OPENER

Share the following with learners to orient them to the topic:

- Insects are some of the most important and misunderstood animals on the planet. They do very essential work! They turn flowers into fruit through pollination, eat dead animals and plants to help keep environments clean and cycle nutrients, and are an essential food source for many animals like birds and bats.
- Some scientists believe there are millions of insect species yet to be discovered.
- Scientists can sometimes use simple observation to study insects. But it is often necessary to trap insects to really understand them. It is important to remember that scientists use traps with a purpose and always treat this process very seriously.
- Today you will be asked questions and work as a group to recommend materials that could be used to trap an insect to study. We will provide a worksheet that will lead you through the design process.
- At the end of your work time, you will recommend which materials you think are best for designing a trap and describe how the traps would be used. You will also draw and share your ideas.

LESSON QUESTIONS

As time allows, encourage each student to debrief their thinking and their design with the whole group:

- Which insect type did you select? Why?
- Which types of material do you think would be most effective at catching your insect type?
- What did you imagine your trap design would look like?
- How are the traps scientists use different from the ones you were imagining?

PRE-LESSON EXPLORATIONS

Have learners complete any of these prompts:

- **“Think like an insect” journal entry:** Pretend you are an insect, and write a journal entry as if you were that insect. Imagine where you might live, what you would do, where you would travel in a day, how you would get there, and the food you would eat.
- **Natural traps:** Identify traps that insects or spiders make in nature (such as spiderwebs) and traps that nature makes for insects (such as Venus flytraps, pitcher plants).

POST-LESSON EXPLORATIONS

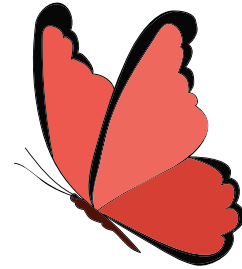
Have learners complete any of these prompts:

- **Make a trap:** Now that you know what traps are and what materials they are built out of, build your own using the materials provided.
- **Community science:** If you have access to an outdoor space, use iNaturalist’s app Seek (find link in Additional Resources) to explore a small area for 5 minutes and see how many insects you can find. You can use the **Insect Information Sheet** to find information on where insects might be. If you can’t go outside, remember our houses are full of insects too! See if you can find some in your own house.
- **Ask an entomologist:** Do you have questions only an expert could answer? Make a list and send it to your local extension office or public garden.
- **Class Venus flytrap:** How do *plants* trap insects? Consider getting a Venus flytrap for your class. Hypothesize which insects will come to it and what to feed it.



ADDITIONAL RESOURCES

- Seek by iNaturalist—an app to help identify insects: bit.ly/PH-Seek
- Plant Heroes insect field guides: bit.ly/PH-EdC-FG
- How to make an insect pitfall trap (for kids): bit.ly/PH-pitfall
- Information about natural traps:
 - Venus flytrap video: bit.ly/PH-venusflytrap
 - Venus flytrap information from National Wildlife Federation: bit.ly/PH-NWF-flytrap
 - Yellow garden spider information from National Wildlife Federation: bit.ly/PH-NWF-gardenspider



ADAPTATIONS

If you have additional time and a willing group of students, try building the traps using the materials you have at hand.

WORD BANK DEFINITIONS

decomposer: an organism that breaks down dead organisms and wastes into other materials

pollinators: animals that help flowering plants reproduce by moving pollen around, often while the animals are feeding

prey: an organism that is killed and eaten by another organism called a predator

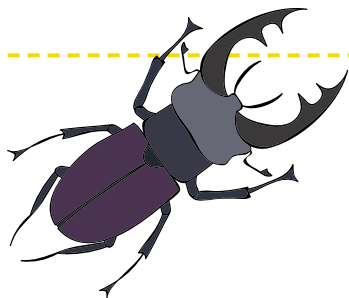
predator: an organism that kills and eats other organisms called prey

pest: an organism that exists where it is not wanted; often harmful to people

diurnal: active mostly during the day

nocturnal: active mostly at night

biodiversity: the variety of living organisms that exist in an environment





Trap Design Worksheet

1) What type of insect are you trying to capture? What size is it? How does it move? Is it active at night or during the day? Refer to the Insect Information Sheet to find what you need to know.

2) BRAINSTORM. Look at these materials:

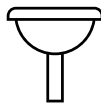
STRAW



TAPE



FUNNEL



FLASHLIGHT



NET



Select which material would be best for trapping your insect. Explain why.

3) Can you think of other materials not on this list that could work for trapping insects?

4) Imagine what a trap design for your insect would look like. Draw it in the space provided.

Trap Information Sheet

Different types of traps are used to capture insects based on how they move and when they are active. An insect that crawls on the ground might be captured by falling into a hole it did not expect, while a flying insect might be captured when it lands on a sticky surface.

There are many types and variations of traps used by people who study insects.

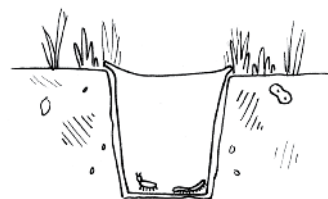
Here are some examples.



MALAISE TRAP

HOW IT WORKS: Insects fly into the net and move toward the tent's top. As they crawl to the edge, they find an opening at the side that leads to a liquid trap.

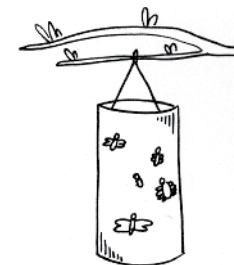
TYPES OF INSECTS: Flying insects (flies, wasps, butterflies)



PITFALL TRAP

HOW IT WORKS: Insects fall into a container while walking on top of the surface of the soil.

TYPES OF INSECTS: Insects walking on soil (beetles, ants, crickets)



STICKY TRAP

HOW IT WORKS: Insects get caught in a sticky substance as they land on the trap's surface. These traps are hung above the ground to avoid collecting dirt, which can make them less sticky.

TYPES OF INSECTS: Flying insects (moths, beetles, flies)

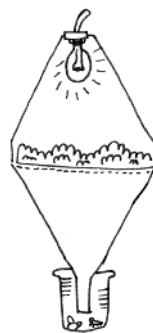


PAN TRAP

HOW IT WORKS: Small containers filled with liquid are painted to mimic flowers (yellow, blue, white). Insects land in the pan thinking they are landing on a flower.

TYPES OF INSECTS: Flying insects that visit flowers (bees, flies, wasps)

BERLESE FUNNEL (not technically a trap, but a device to remove insects from soil)



HOW IT WORKS: A sample of soil is taken to a Berlese funnel. Soil is placed into the funnel and over a jar with liquid. A heat lamp is placed over the soil, causing the insects to drop out of the funnel and into the jar.

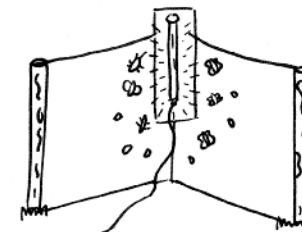
TYPES OF INSECTS: Soil-dwelling insects (centipedes, millipedes, nematodes)

BUCKET TRAP WITH FUNNEL



HOW IT WORKS: Insects enter a bucket through the large opening of a funnel. They cannot get back out through the small hole of the funnel. Often a scent is added that attracts a certain type of insect.

TYPES OF INSECTS: Flying insects (fruit flies, beetles, wasps)



LIGHT TRAP

HOW IT WORKS: A sheet is hung up tautly with a light shining on it at night. The light attracts insects who become dazed and do not fly away.

TYPES OF INSECTS: Flying insects that are active at night (moths, beetles)

Insect Information Sheet



INSECT: BUTTERFLY

ORDER: Lepidoptera

OF KNOWN SPECIES: 17,500

PHYSICAL DESCRIPTION:

- Have scales in their wings
- Colors vary (solid to patterned)
- Size range: Wingspan 0.5" to 12"

HOW THEY MOVE:

- They fly from flower to flower
- Active in the day (diurnal)



INSECT: MOTH

ORDER: Lepidoptera

OF KNOWN SPECIES: 180,000

PHYSICAL DESCRIPTION:

- Light in color (white to green)
- Size range: Wingspan 0.1" to 9.4"

HOW THEY MOVE:

- They fly from flower to flower
- Most are active at night (nocturnal)



INSECT: BEETLE

ORDER: Coleoptera

OF KNOWN SPECIES: 350,000

PHYSICAL DESCRIPTION:

- Colors vary (solid to patterned)
- Size range: 0.12" to 6.6"

HOW THEY MOVE:

- They crawl; some can fly
- Can be active in the day or night



INSECT: ANT

ORDER: Hymenoptera

OF KNOWN SPECIES: 150,000

PHYSICAL DESCRIPTION:

- Mostly red or black; some are green
- Size range: Length 0.05" to 1.2"

HOW THEY MOVE:

- They crawl; some can fly
- Can be active in the day or night



INSECT: PLANT HOPPER

ORDER: Hemiptera

OF KNOWN SPECIES: 12,500

PHYSICAL DESCRIPTION:

- Various colors and shapes
- Size range: 0.4" to 2"

HOW THEY MOVE:

- They jump between plants
- Most are active during the day (diurnal)



INSECT: FLY

ORDER: Diptera

OF KNOWN SPECIES: 1,000,000

PHYSICAL DESCRIPTION:

- Colors vary
- Size range: Length 0.01" to 2.5"

HOW THEY MOVE:

- They fly and walk on surfaces
- Active during the day (diurnal)



INSECT: BEE

ORDER: Hymenoptera

OF KNOWN SPECIES: 150,000

PHYSICAL DESCRIPTION:

- Colors vary; some are very hairy
- Size range: Wingspan 0.07" to 2.5"

HOW THEY MOVE:

- They fly and walk on flowers
- Most are active during the day (diurnal)



INSECT: CICADA

ORDER: Hemiptera

OF KNOWN SPECIES: 3,000

PHYSICAL DESCRIPTION:

- Colors vary
- Size range: 0.7" to 2"

HOW THEY MOVE:

- They fly and crawl on the ground and trees
- Can be active in the day or night