

Be the Bee

Grade Level

K - 2nd grade
3rd - 6th Grade

Lesson Length

10 min intro. 20 min activity. 2-5 min summarize.

STEM Careers

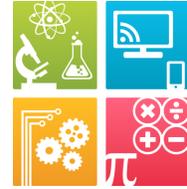
- Entomologist
- Teacher
- Zoologist
- Conservation Biologist

Topic Focus

Educate school-aged students, their parents, and communities about the ecosystem services insects provide in agroecosystems



This lesson is part of the Beneficial Insects Curriculum. These lessons can be adapted for use with a variety of ages.



Learning Objectives

By the end of the lesson, students should be able to:

- Identify 6-8 plants that need pollination from honey bees
- Discuss how stressors, predators, temperatures affect bee health.
- Explore ways to help **pollinators**, such as providing more flowers through deliberate plant choice

Educational Standards Supported (Nebraska Early Learning Guidelines)

- SC.3.9.3.C Use evidence to support the explanation that traits can be influenced by the environment.
- SC.4.6.3.C Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information.
- SC.6.9.3.A Construct an argument based on evidence for how plant and animal adaptations affect the probability of successful reproduction.

Materials List

- Food pictures: in color, photos of foods bees do and don't pollinate.
- Diagram of a flower/pollination.
- Yes-No signs: print; tape somewhere the kids can see
- Predator/ Stressor signs: print; pair with binder clip (easy to clip on kid's shirt).
- Paper plates: between 10-20 plates (you can decorate as necessary) to look like various, diverse flowers.
- 2 buckets, one for each hive (team).
- "Pollen balls": small balloons, styrofoam balls, anything round with various colors and sizes works great.
- "Wings": flag football belt or something the kids can wear as bee wings and pull instead of tagging. Each kid gets 2- one on each side of their pants.
- Acceptance- that everything is going to get stomped on and crinked ;).



Lesson

Introduction

Bees are important creatures that pollinate many of the fruits, vegetables, and nuts that we eat. There are over 4,000 different species of bees in North America. While they are different sizes and colors, all bees have 4 wings to fly, chewing and lapping mouthparts to eat **pollen** (protein) and **nectar** (carbohydrate), and big eyes to see flowers and other bees. Bees also go through complete **metamorphosis** with a lifecycle that begins with an **egg**, the **larva** or caterpillar stage, **pupa** stage, and finally, they develop into the **adult** stage.

Bees have evolved with plants to have special abilities to transport pollen from one flower to the next. This pollen contains part of the instructions for producing the next generation of plants (in the form of seeds). Pollinated plants produce seed and fruits that surround the seed. Some bees are social and work together in colonies to forage for food and nectar while many other types of bees live as single bees or as small family units. Many types of bees are declining in population (becoming rarer). In the upcoming activities, we will learn more about how pollination occurs and some of the reasons why bee populations are declining.

Opening Questions

- *What kinds of animals are pollinators? Where do they get their food?*
- *Why do we need pollinators?*
- *How does pollination work?*
- *What kinds of plants need pollination?*

Activity #1: Food Pollination Activity

~ 10 minutes

1. Tape “yes” and “no” signs to opposite walls, columns, or somewhere else where the kids can see them.
2. Have kids line up in the center of the room and hold up pictures of food. Then have kids move to the appropriate side

Glossary words:

Adult - a fully formed insect that has wings and is possibly capable of reproducing.

Disease - a sickness that harms an organism or possibly even kills it.

Egg – an oval or round thing from which a snake, frog, insect, etc., is born.

Flower - the reproductive part of the plant that forms the seeds and/or fruit, usually with the help from pollinators.

Insect - a small animal that has six legs and a body formed of three parts and an exoskeleton.

Larva - a very young form of an insect

Metamorphosis - a major change

depending on whether they think “YES” or “NO” bees or other insects pollinate it.

3. Display the diagram of the flower and explain how pollen is transferred from one flower to another to create a seed. Discuss different pollen grain types and how bees store nectar from flowers to take home for food.
4. Discuss how different stressors affect bees ability to properly collect resources for their young and pollinate plants.

When a bee visits one flower and then goes to another, they are doing us a great service as the product of these visits is called pollination. Pollination is the fertilization of plants resulting in seed and fruit creation. One out of every three bites of food comes from the pollination of bees and other insects. Along with pollination services, honey bees provide us with honey and beeswax, and also indicate when there has been contamination in the environment where their hive is located. Scientists can look at honey bee health to gauge the impact that pesticides or chemical spills may be having on native bees and other insects in the area.

Activity #2: Pollination Game (min. of 10 kids)

Setup

1. Place flowers in patches & spaced with pollen balls in the center of the flowers.
2. Set a bucket, tote, or other form of container out for the “bee” players to call their “hive” and bring pollen back to. This will be a safe base from predators. Note that the hive is NOT a safe base for chemicals, extreme temperatures, varroa mites, and disease as these can still affect bees in the hive.
3. Divide students into two groups. One group will represent the bees and the other group will represent the “stressors”.
 - a. The number of “stressor” players for each round will be dependent on how many kids are playing. We recommend a 1:5 ratio of “stressor” players to “bee” players in the first round.

in the form or structure of some animals or insects that happens as the animal or insect becomes an adult

Nectar - a sweet liquid produced by plants and used by bees in making honey; source of sugar

Pesticide - a chemical used to kill pests such as insects, weeds, or rodents

Pollen - the very fine usually yellow dust that is produced by a plant and that is carried to other plants of the same kind usually by wind or insects so that the plants can produce seeds; protein source; contains genetic code of plant

Pollination - to give (a plant) pollen from another plant of the same kind so that seeds will be produced

- b. If needed, do several rounds using different combinations of stressors each time.
- c. For full details on different stressor roles, see the supporting “Player Role Assignments” PowerPoint for more details and the “Be the Bee Game instructions” for the age group that’s playing.

Pollinator – animals that help pollinate flowers and plants

Predator - an animal that hunts other animals for food

Pupa - an insect that is in the stage of development between larva and adult

Stressor - something in the environment that harms a species’ survival rate

Varroa mite - a non insect pest of the honey bee that affects a honey bee colony's ability to survive and overwinter properly.

Post Activity Discussion

1. After the first round, gather the students and discuss what they noticed. Count the pollen collected and how many different types/colors of pollen were collected.
2. Have students brainstorm what variables they need to change to see the effects of different stressors and combinations of stressors.
 - a. Another option is to have “bee” players divide into two teams and look at how two smaller beehives are affected compared to one big beehive (this approach requires another bucket). This option also introduces the mechanic of hive competition for pollen.
 - b. Using different ratios of flowers to bees could also be used to demonstrate the support that bees get from different environments. (ex. a lawn or corn field vs. a park, roadside, or flower garden)
3. Count pollen: This demonstrates competition between bees and diversity of pollen types (how many different flowers the “bees” visited)
4. Impact of spaced flowers: This shows the importance of habitat & corridors
5. Impact of stressors: This shows how stressors in the environment impact species survival.
6. Moving pollen in their “pollen sacs”: This shows speciation in how different species perform different roles in the ecosystem as well as how they accomplish those roles with specific adaptations.

7. Floral types: This shows speciation to attract certain pollinators.

What you can do to help

1. Plant native species with various seasons
2. Don't use chemicals (insecticide, fungicides or herbicides)
3. Prevent invasive species



Elaborate/Extend

Ask children to photograph or draw pictures of the insects visiting the flowers. Children can label the parts of the insects relative to the importance of its role in nectar and pollen collection (e.g. eyes for seeing flowers; wings for flight from flower to flower; hairy bodies to aid in pollen collection; pollen baskets on honey and bumble bees, etc.).



Evaluate/Reflect

- *Why do we need pollinators?*
- *What special body parts do pollinators have to help them collect nectar and pollen?*
- *Why do we need flowers?*
- *What is the connection between pollinators and flowers?*

We want to hear from you!

Let us know what you thought of the lesson or send us a picture of youth participating in the lesson. Please send images and feedback to unlbeelab1@gmail.com!



Supporting Lesson Materials

- <https://drive.google.com/drive/folders/15GpkJG0Y5Z7hVB-pFLKadJWt3pNMm8AL?usp=sharing>
 - o View only - Make a copy of the folder and then print or edit as necessary

References/Resources:

- www.fws.gov/pollinators
- Learner's Dictionary - <http://learnersdictionary.com/>
- <https://www.npwrc.usgs.gov/pollinator/home>
- Xerces Society - <https://xerces.org/>

- Nebraska Science Standards Guideline
https://www.education.ne.gov/wp-content/uploads/2017/07/Nebraska_Science_Standards_Final_9-8-17.pdf

Suggested Children’s Books:

- Gibbons, Gail. (1997). *The Honey Makers*. Singapore: Tien Wah Press.
- Allen, J. (2000). *Are you a bee?* Boston, MA: Kingfisher.
- Barton, B. (2017). *Give bees a chance*. New York, NY: Viking.
- Milner, C. (2018). *The bee book*. New York, NY: DK Publishing.
- Slade, S. (2010). *What if there were no bees*. Mankato, MN: Picture Window Books.

Authors: Courtney Brummel

Outreach Coordinator, UNL Bee Lab
cbrummel3@unl.edu

Shelby Kittle

Program coordinator, UNL Bee Lab
shelby.kittle@huskers.unl.edu

Judy Wu-Smart

Associate Professor & Extension Specialist, Department of Entomology
jwu-smart@unl.edu

Doug Golick

Associate Professor, Department of Entomology
dgolick2@unl.edu

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