# Pollination Pals

*Pre-/Post-Site Materials*

Forest Preserve District
OF WILL COUNTY

*Bringing People and Nature Together*

# Table of Contents

## Field Trip at Plum Creek Nature Center



## Correlated State Standards

Identified ELA, Math and Science Standards are detailed below specific to this education program.
Source: Forest Preserve District of Will County, the Council of Chief State School Officers (Common Core), and the National Research Council (Next Generation Science Standards)

### ELA Standards

| Subject Codes | Grade 2 |
|---|---|
| Writing (W) | 2.8 |
| Speaking and Listening (SL) | 2.1, 2.2. 2.3, 2.6 |
| Language (L) | 2.1, 2.2., 2.3, 2.5 |

### Math Standards

| Domain | Grade 2 |
|---|---|
| Measure and Data (MD) | 2. MD.1 |

### NGSS Standards

| Disciplinary Idea | Grade 2 |
|---|---|
| Life Science 2, Ecosystems | 2-LS2.1<br>2-LS2 .2<br>2-LS4.1 |

COMMON CORE STATE STANDARDS INITIATIVE
PREPARING AMERICA'S STUDENTS FOR COLLEGE & CAREER

NEXT GENERATION SCIENCE STANDARDS

# References

## Glossary of Terms

**Angiosperms** – Flowering plants.

**Pollination** – bringing pollen grains from the male's reproductive part to the female's reproductive part to enable reproduction and fertilization.

**Pollinators** – the biotic agent (vector) that moves pollen from the male anthers of a flower to the female stigma of a flower to accomplish fertilization or "syngamy" of the female gametes in the ovule of the flower by the male gametes from the pollen grain.

**Adaptation** – also called an adaptive trait, is a trait with a current functional role in the life history of an organism that is maintained and evolved by means of natural selection.

**Vectors** – transportation agents that move the pollen from one plant flower to the other, such as wind, fauna and water.

**Fauna** – all of the animal life of any region or time.

**Pollen** – a fine to coarse powder containing the microgametophytes of seed plants, which produce the male gametes (sperm cells).

**Nectar** – a sugar-rich liquid produced by plants in glands called nectaries, either within the flowers with which it attracts pollinating animals, or by extrafloral nectaries, which provide a nutrient source to animal mutualists, which in turn provide antiherbivore protection.

**Fertilization** – when the male and female parts or gametes connect to reproduce or make a new organism.

**Stigma** – the pollen-receiving part of the flower where pollen grains germinate.

**Ovule** – the structure that gives rise to and contains the female reproductive cells.

**Ultraviolet (UV)** – an electromagnetic radiation with a wavelength from 400 nanometers (nm) to 100 nm, shorter than that of visible light but longer than X-rays.

## Recommended Books & Websites


Helen, Ruth. "The Reason For a Flower." New York: Penguin Putnam Books for Young Readers. 1999.

Dasher, S.H., Leonard, B.A., & Robb, K.L. "Africanized Honey Bee Curriculum." Unit A, Lesson 1.

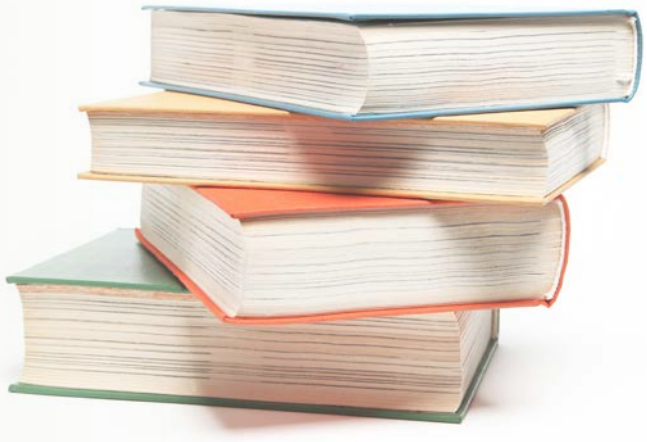
University of California Cooperative Extension. "The Ecological Society of America, Pollination Tool Kit." 1995.

National Gardening Association. "The Secret Life of Flowers. Growing Ideas: A Journal of Garden-Based Learning." 10(3). 1999.

National Gardening Association. "It Came From Planted Earth." Session Six: Insects & Pollination. University of California. 2001.

Smithsonian in Your Classroom. Plants and Animals: Partners in Pollination (Nov/Dec 1997).
*http://www.smithsonianeducation.org/educators/lesson_plans/partners_in_pollination/index.html*

University of Arizona Africanized Honey Bee Education Project. Africanized Honey Bees on the Move.
*http://ag.arizona.edu/pubs/insects/ahb/lsn24.html*

# Activities

## Flower Sorting Collage

Students strengthen observation and classification skills by sorting flower pictures into different groups.

**Materials**

- Magazines
- Construction paper
- Scissors
- Glue
- Markers

**Directions**

1. Give students a selection of magazines, and ask them to find and cut out pictures of flowers. Challenge them to find a specific number of pictures, or as many different kinds as they can in a given time period.
2. Ask your students to examine their pictures carefully, and to look for similarities and differences.
3. Guide the class through a brainstorming discussion about the various ways these flowers could be sorted or classified.
4. Explain that scientists constantly group and regroup living and non-living things in order to better understand their relationships to each other.
5. Have your students sort the pictures either by an assigned grouping, such as color or shape, or a grouping of their choice.
6. Students can then glue the groups of pictures onto a sheet of construction paper, writing their sorting theme as the title and the description of each group.
7. Hanging these collages as a classroom display encourages students to think about the many ways of classifying living things.

## What We Would Do Without Pollinators

Participants explore how we are dependent on pollinators for many of the foods we eat.

**Materials**

- Grocery bag or large picnic basket
- 8 to 12 food items*
- Food pictures (one per student at least)
- Restaurant menus (one per student at least)

**Make sure that some of these foods require pollination and that some do not.*

**Directions**

1. Review the concept of pollination and fruit development. Explain to your students that you want to see how good they are at identifying which foods depend on pollinators and which foods do not.

   *https://en.wikipedia.org/wiki/List_of_crop_plants_pollinated_by_bees*

   *http://pollinator.org/list_of_pollinated_food.htm*

   *http://plants.usda.gov/pollinators/Native_Pollinators.pdf*
2. Take foods out of the bag or basket one at a time and have the children say "pollinator" or "no pollinator," and then place the foods in two separate piles. If the children are not correct, help them think about where the food item comes from and then place it in the appropriate group.
3. By the time you have identified all of the foods, you should have one group of foods that does not require pollination (usually this group will be smaller and not very colorful) and one group of foods that does require pollination (usually a large selection of colorful foods, including lots of fresh fruits and vegetables). Discuss what it would be like to be without all of the foods that depend on pollination – how unenjoyable and unhealthy our diets would be.

## A Sampling of Crops Benefiting From Pollination

**Fruits and Nuts**

Apples
Chestnuts
Macadamia Nuts
Peaches
Apricots
Coconuts
Cacao
Nectarines
Crabapples
Palm Oil
Olives
Pears
Cashew Nuts
Dates
Cherries
Plums
Figs
Papaya
Passion Fruit
Kiwi
Pomegranate
Strawberries
Raspberries
Cranberries
Blackberries

**Vegetables**

Artichokes
Asparagus
Balsam
Beets
Broccoli
Brussel Sprouts
Sprouts
Cauliflower
Carrots
Celery
Chicory Root
Cucumbers
Chives
Green Peppers
Parsnip
Rutabagas
Turnips
Radishes

**Others**

Coffee
Dill
Parsley
Lavender
Black Pepper
Mustard
Sunflower Seeds
Vanilla
Sesame Seeds
Nutmeg
Fennel
Guava

## What We Would Do Without Pollinators, Extension

**Materials**

"Bee-Free Grill Out Menu" (one copy per student)

**Concept Application:**

1. Ask your students to imagine a world without bee-pollinated plants: the "Bee-Free Zone." Explain that they are going to attend a Bee-Free Grill Out in the Bee-Free Zone and that hamburgers and hot dogs are on the menu.

2. Ask your students to pretend they have chosen a hamburger or hot dog from the grill. Hand out the Bee-Free Grill Out Menu. Remind them that this is the Bee-Free Grill Out Menu. Have the students check off the items on the list that they could not have at the Bee-Free Grill Out.

3. After they have eliminated the pollinator-dependent items from the list, they can now choose what they will have with their hamburger or hot dog. Have them describe the meal that would remain.

4. Draw conclusions and develop statements about the need for pollinators in our environment. How often do you notice bees, butterflies and hummingbirds in your neighborhood?

## Foods Pollinated by Animals

**Hamburgers**
Cows eat alphalpha. (Bees)

**Cheese**
Cows eat alphalpha. (Bees)

**Ketchup**
Tomatoes (Bees)

**Mustard**
Mustard plant (Bees)

**Guacamole**
Avocado (Bees)

**Onion**
(Bees and Flies)

**Pickles**
Cucumber (Bees)

**Relish**
Cucumber (Bees)

**Lettuce**
(Bees)

**Tomato**
(Bees)

**Watermelon**
(Bees)

## Helpful Hints

**Some other more common foods that we enjoy from animal-pollinated plants include beans, green peppers, chili peppers, lemons, limes, oranges, berries, vanilla, almonds and apples.**

**Most grass plants such as wheat, corn and sugar cane are pollinated by wind and not by animals.**

# Bee-Free Grill Out Menu

**1.** **Choose one:**

☐ Hot dog ☐ Hamburger

**2.** **Choose what you want on your hot dog or hamburger:**

☐ Ketchup ☐ Pickles ☐ Onion

☐ Mustard ☐ Lettuce ☐ Cheese

☐ Guacamole ☐ Tomato

**Additional items:**

**3.** **Choose what you would like to eat with your hot dog or hamburger:**

☐ Watermelon ☐ Potato Chips ☐ Corn on the Cob

**4.** **Give your best guess on which foods are pollinated by animals like bees. Scratch out these foods.**

**5.** **Discuss with your class and teacher which foods are pollinated by animals. What kind of meal would you have if we did not have pollinators?**

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