

Materials Needed

- Paper towel or napkin
(to represent the flower)
- Black pepper, ground (to represent the pollen)
- Foam cup or plate (#6 plastic), or Hard rubber hair comb, or Plastic drinking straw (to represent the “bee”)
- Silk cloth, or Hair that is clean and dry, or Angora (rabbit hair) cloth (to electrically charge the “bee”)
- Writing Pencil or waterproof Pen or Marker
- Copy paper
- Scissors

Grade Range

3-5
6-8

Topics/Skills

Science: Ecosystems;
Engineering Design

Learning Standards

NGSS: [Interdependent Relationships in Ecosystems](#)

Duration

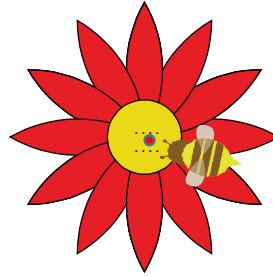
15-20 minutes

Prep Time

10 minutes

Pollen is Precious

Prevent Pollen Pollution from Precipitation



Without pollen, flowering plants cannot make seeds to reproduce. Many flowering plants depend on bees and other insects to pollinate them. Flowers have evolved several different strategies for making pollination efficient. For many flowers that are pollinated by bees, dry pollen works best. This activity demonstrates some of the ways that flowers can protect their pollen from getting wet. This activity can be done in combination with RAFT Learning Activity Sheets [Bee a Pollinator](#) and [A Flower for every Pollinator](#).

Activity Challenge

Demonstrate that dry pollen is more readily picked up by bees than damp pollen.

Preparation

1. Define workspace and collect the Materials Needed. Lay out the materials on a sheet of newspaper, paper bag or other non-metallic material.

To Do

1. Using a pencil or waterproof marker draw a simple flower shape, (like the one shown above), on 2 different 4 to 6-inch squares of paper towel or napkins. Using a scissors, cut out the 2 flowers.
2. Dampen one of the flowers by thoroughly sprinkling with water, then squeezing out any excess water. Lay the damp and dry flowers flat on the work surface, next to each other.
3. Sprinkle some black pepper “pollen” in the center of each of the cut-out flowers. On the damp flower, gently press the “pollen” grains onto the flower.
4. Referring to the Materials Needed, cut an approximately 1-inch long bee shape out of one of the items listed “to represent the ‘bee’”.
5. Induce a static electric charge on the “bee” by rubbing the bee with one of the materials listed “to electrically charge the ‘bee’”.
6. Move the charged “bee” close to the “pollen” on the dry flower. Some of the pollen should jump from the flower to the bee and stick to the bee.
7. Wipe the pollen off the bee, and repeat step 5 to re-charge the bee.
8. Repeat step 6, but this time the bee should visit the damp flower. The damp pollen should not be attracted to the bee.

Observations

As bees fly through the air, they build up a positive (+) electrical charge. Dry pollen typically has a negative (-) charge. Dampness from dew, mist, or rain can cause the negative charge to leak off the pollen. When the pollen is dry, the negatively

charged pollen is attracted to the positively charged bee, because things with opposite charges attract.

Extensions

Search for pictures of a few of the flowers listed below. All these flowers protect their pollen by closing at night and during a rainstorm. Several of them are wildflowers, which some people call “weeds”. Locate a few of the flowers in your neighborhood on a sunny day. Take pictures or draw the open flowers you find and note their location in your STEAM journal so you could find them again. At dusk, visit the flowers that you noted in your journal, and take a photo or draw them when the flowers are closed.

Beans
Magnolia

Peas
Morning glory

Clover
Tulip

Daisy
Dandelion

California poppy
Water lily

How does closing at night protect the flower’s pollen from dew? What keeps the pollen dry on a sunny day?

Some flowers use other ways to protect their pollen from dampness.

- Notice the different shapes and orientations of various flowers that you see.
- Draw or take photos of 2 – 3 flowers that do not close at night but protect their pollen in other ways.
- Write one sentence for each of these flowers that describes the way the flower keeps its pollen dry.

The Science Behind the Activity

Pollen is a powdery substance that carries the male half of the genetic material (DNA) that a plant needs to make seeds. Pollen comes in many colors, depending on the plant species. Pollen is produced by the male portion of a flower, called the **stamen**. Pollinators pick up and carry the pollen from flower to flower, with some of it brushing off onto the female portion, called the **pistil**, of the same or another flower. The genetic material makes its way to the ovary, where the plant’s seeds are fertilized to enable them to grow when the conditions are right.

Some pollinators, like bees, also collect pollen for food. For bees, it is important to collect as much pollen as they can carry and still fly. When dry, pollen has a negative (-) static electric charge. Bees gain a positive (+) static electric charge as they fly. Since positively and negatively charged things are attracted to each other, pollen is attracted to bees when they visit to collect nectar, a sweet liquid that they make honey from. When pollen gets wet, the dampness drains the negative charge from the pollen, so the pollen will be less attracted to bees. This negatively affects the flower, because it is less likely to be pollinated. It also negatively impacts the bee as it has less pollen to make food.

Dew forms when water vapor in the air condenses into water droplets on objects that cool down to a temperature below the **dew point** during the night. Flowers that close at night, and on dark rainy days, display a behavior called **nyctinasty**. The petals close and open because of changes in water pressure in different parts of the flower due to varying amounts of sunlight. A flower that is closed during the night keeps the temperature of the pollen inside the flower warmer, above the dew point, keeping the pollen dry.