

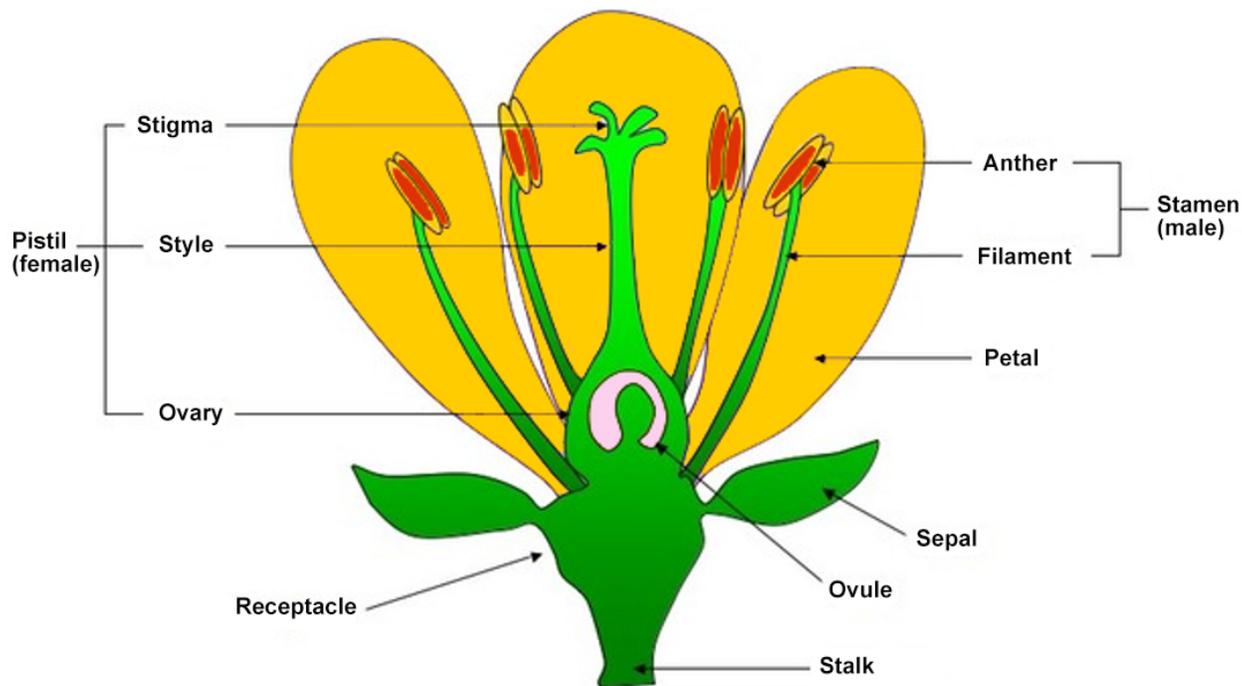
## Pollinator Info

### What is Pollination?

When pollen is transferred from the anther (male part) of a flower to the stigma (female part), pollination happens. This is the first step in a process that produces seeds, fruits, and the next generation of plants. However, seeds are produced only when the pollen is moved between flowers of the same species. This can happen through self-pollination, wind, and water pollination.

The animal that is pollinating the plant is often eating or collecting pollen for its own use or it is sipping nectar from the flower when pollen grains attach themselves to the animal's body. When the animal visits another flower for the same reason, pollen can fall off onto the flower's stigma and may result in successful reproduction of the flower. Once on the stigma, pollen may "germinate," which means that a "pollen tube" forms on the sticky surface of the stigma and grows down into the ovule of the plant.

Pollination is mutually beneficial to both plants and pollinators. Pollination results in the production of seeds and is necessary for many plants to reproduce. Meanwhile, sugary nectar provides pollinators with carbohydrates, while pollen offers proteins, fats, vitamins, minerals, and necessary phytochemicals.



***Parts of a flower***

Image Source: <https://www.canr.msu.edu/resources/smart-gardening-pollination-in-vegetable-gardens-and-backyard-fruit>

### Why is Pollination Important?

Simply put, if we want to eat, pollinators need to exist. Of the 1,400 crop plants grown around the world (those that produce all of our food and plant-based industrial products) almost 80% require pollination by animals. Pollinators are important to over 180,000 different plant species. That means that 1 out of every three bites of food you eat is there because of pollinators, including chocolate, many varieties of fruits and vegetables, and nuts. Pollination is also important for things you drink, like coffee and tequila.

## **Meet the Pollinators**

There are several different species of pollinators, including ants, bats, bees, beetles, birds, butterflies, flies, moths, and wasps.

### **Ants**

Ants are particularly beneficial to tropical plants that make it difficult for bees and other pollinators to access internal nectar. Plants that secrete nectar on the outside of the flower and on their leaves attract ants, which act as a guard for the plant from other insects that try to take nectar.

### **Bats**

Bats are very important pollinators in tropical and desert climates. Most flower-visiting bats are found in Africa, Southeast Asia, and the Pacific Islands. Over 300 species of fruit depend on the pollination of bats. They are most attracted to flowers that are open at night because bats are nocturnal. In addition to nectar, they also snack on the insects in the flower.

### **Bees**

Bees are the most numerous and effective pollinators, in large part due to their fuzzy bodies. They require a lot of energy to survive, and they actively seek out nectar and pollen for themselves and their young. In the United States, there are roughly 4,000 species of native bees, some of which are endangered. Many bees are generalists, but some species are specialized pollinators that require specific host plants to survive.

### **Beetle**

Beetles were one of the first insects to visit flowers, and are important for ancient species such as magnolias and spicebush. They eat through parts of the plant, and even poop within the flowers. Beetles have been around since the Mesozoic Era (250-65 million years ago), which is also when dinosaurs walked the Earth.

### **Birds**

There are 2,000 bird species worldwide that not only feed on nectar, but also the insects and spiders connected to nectar-bearing flowers. Hummingbirds in particular are great pollinators because of their long bill, good vision, and attraction to red. Hummingbirds weigh 2-8 grams (in comparison, a penny weighs 2.5 grams), and eat frequently because they have to fuel a heart that beats 1,200 times per minute and wings that beat 70 times per second. As a result, they eat several times their weight in nectar each day.

## **Butterflies**

Although butterflies are very active during the day and visit a variety of flowers, they are not very efficient pollinators because their bodies don't pick up much pollen. Butterflies use their proboscis to probe a flower for nectar, which is how they fuel their flying. They have good vision and can see red, but they have a weak sense of smell. Many butterflies produce a scent to attract the opposite sex that smells like the flowers they are attracted to.

Monarch butterflies feed on the leaves of milkweed plants. The milky juice of the plant, once ingested, makes the caterpillars and the adult butterflies distasteful to birds and other predators. Some butterflies, like the viceroy butterfly, are not milkweed eaters, but they mimic the color and patterns of the distasteful milkweed butterflies as a survival strategy.

## **Flies**

While flies are not as hairy as bees or as efficient at carrying pollen, they are still good pollinators. Some flies, such as syrphids, mimic bees and wasps, but only have one pair of wings, while bees and wasps have two. Flies are attracted to foul-smelling flowers, including the Red Trillium, which some people say smells like rotting flesh. Generally, the flowers that flies pollinate do not produce nectar.

## **Moths**

Some moths, like bats, are nocturnal pollinators. They, also like bats, are attracted to pale or white flowers. Some moths hover over flowers, while others land. Hawkmoths are great flyers and have tongues longer than their bodies. They fly upwind, tracking the scent of flowers. The yucca plant is dependent on the yucca moth for its survival.

## **Wasps**

Wasps are important pollinators. Although they look like bees, they are not covered in fuzzy hairs, which makes them less efficient pollinators because the pollen is less likely to stick to their bodies. Like bees, wasps also have high energy needs, therefore they often look for pollen and nectar from variety of flowers. True wasps have stingers they use to capture insects or spiders for food for their larvae. Fig wasps pollinate almost 1,000 species of figs.

## **Types of Pollination**

There are two different ways a plant can be pollinated: self- pollination and cross-pollination.

## **Self-Pollination**

This is when a plant can pollinate itself without outside help. While this can make a plant more self-sustaining, it can also decrease in genetic diversity. The anther opens and the pollen lands on the stigma of the same flower.

## **Cross-Pollination**

The plant needs outside help to get its pollen to another flower of the same species. The anthers open on one flower and the wind or animal moves pollen to the stigma of another flower of the same species. Plants can use wind, water, or an animal to cross pollinate.

- **Wind:** Wind pollinated plants generally have flowers that appear early in the spring, before or as the plant's leaves are emerging. This prevents the leaves from interfering with the dispersal of the pollen from the anthers and provides for the reception of the pollen on the stigmas of the flowers. They also produce large numbers of small pollen grains.
- **Water:** Aquatic plants are pollinated by water. Pollen floats on the water's surface until it comes into contact with a flower. However, this type of pollination is rare (only about 2%). Most aquatic plants are pollinated by insects, with flowers that rise up from the water into the air.
- **Animals:** Animals play the biggest role in pollinating flowers and crops that people eat. Pollinators visit flowers in search of food, mates, shelter, and nest-building materials. The energy that powers pollinator growth, metamorphosis, flight, and reproduction comes from sugars in nectar, and the proteins, fats, vitamins, and minerals from pollen grains.

## **Benefits of Pollination**

Aside from having food to eat and pretty plants to look at, there are many benefits of pollination, including fresh air, clean water and soil, and healthy ecosystems.

### **Fresh Air**

Flowering plants produce breathable oxygen by using the carbon dioxide produced by plants and animals as they breathe. Levels of carbon dioxide in the atmosphere have been rapidly increasing in the last century, however, due to increased burning of fossil fuels and destruction of forests, which help pull carbon dioxide out of the air.

### **Clean Water and Soil**

Flowering plants help to purify water and prevent erosion through roots that hold soil in place, and foliage that buffers the impact of rain as it falls to the earth. The water cycle depends on plants to return moisture to the atmosphere, and plants depend on pollinators to help them reproduce.

### **Pollinators = Healthy Ecosystems**

Plants are the foundation of terrestrial food chains. The foliage and/or fruits and nuts that plants make are eaten by herbivores, which in turn are hunted by predators. Furthermore, plants provide shelter and nesting habitat for many animals. Thus, in order to maintain the diversity of our natural

ecosystems, we need healthy pollinator populations to ensure that the next generation of plants will be produced.

## Threats to Pollinators

Many pollinator populations are in decline due to a loss in feeding and nesting habitats. Pollution, pesticide poisoning, disease, and changes in climatic patterns are all contributing to shrinking and shifting pollinator populations. The loss of bee populations in particular poses a big risk to both our agricultural system and the ecosystem that supports other wildlife. At the same time, the iconic monarch butterfly has declined by 90% in just the last 20 years.

## Fun Facts

- Honey bees visit five million flowers to make one pint of honey.
- To produce 150 pounds of honey, bees cover a distance equal to 13 trips to the moon and back.
- 90% of the nation's apple crop is pollinated by bees.
- There are 450 different bee species in New York State alone.
- Bees are the only insect that create food eaten by humans.
- Honey bees will fly up to 4 miles from the hive to collect water, nectar, and pollen.
- Because of their large number of small pollen grains, wind-pollinated plants may be allergens, but seldom are animal-pollinated plants allergenic.

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