Pollination and Pollinators

What Is Pollination?

Pollination is the transfer of pollen from the anthers of a flower to the stigma of the same flower or another flower. The result is the production of fertile seeds. When the pollen transfer happens within the same flower, it is called "self-pollination." When it occurs between different flowers, it is "cross-pollination." Cross-pollination is preferable to self-pollination because it produces more genetic diversity in the plant populations. Genetic diversity plays an important role in the adaptability and survivability of a species (Figure 1).

Some plants have very lightweight, smooth pollen that is easily blown by the wind from one plant to another. Many other plants, however, have heavy, sticky pollen that must be physically picked up from one plant and moved to a different plant.

Who does the work of moving pollen? Various animals can do this task, but insects do most of the work of moving pollen. Bees are the most important movers of pollen, assisted by flies, beetles, wasps, butterflies, and moths. Plants work hard to attract their pollinators and offer them rewards. They offer pollen, an important source of protein, and nectar, a concentrated sugar solution, to lure insect pollinators. The different flower shapes, color patterns, and scents are all part of the plant's efforts to attract pollinators.

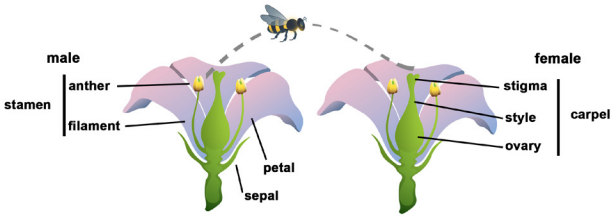

Figure 1. (1) Pollinator receives pollen from the male anther at the top of the stamen. (2) Pollen is deposited on the female stigma at the top of the carpel. (3) The pollen tube elongates from the pollen grain into the style and down to the ovules, resulting in fertilization and seed set. Credits: Harland Patch, Nick Sloff

How Important Is Pollination?

More than 78 percent of flowering plants in temperature regions rely on insects and other animals for pollination. The seeds produced as the result of pollination are the very basis of our ecosystems because plants are at the base of our food webs. These plants also stabilize our soils and help clean our air. Imagine a world without a diversity of trees,

This penstemon flower offers bees a landing pad and nectar guides.

flowers, b irds, a nd m ammals. W ithout p ollinators, our world would be a very different place.

Pollinators are also responsible for many of the fruits, vegetables, and nuts that provide vital nutrition for our families. Without pollinators we wouldn't have abundant blueberries, apples, peaches, tomatoes, squash, and watermelon, to name just a few. Even coffee and chocolate would be less plentiful without pollinators.

Pollinators provide their services to us totally free of charge!

Are Pollinators Really in Trouble?

Yes. Beekeepers have been losing an average of 40 percent of their managed European honey bee colonies every year, compared to a 10 percent historic loss. Declines in other insect pollinator species, such as native bees, flies, butterflies, and beetles, have not been as closely tracked, but recent surveys have shown disturbing population declines and even local extinctions of select pollinator species across Europe and the United States. A comprehensive 2017 review by 84 of the leading world scientists (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services) reported that in some parts of the world 40 percent of bees and butterflies may be threatened or have declining populations.

What Is Causing the Decline?

The cause of pollinator decline is complicated because of the interaction of many different stressors. (Figure 2 on reverse).

The conversion of natural habitats to cropland or suburban development

fragments pollinator habitat and diminishes the availability of floral resources. Nesting sites are often limited in our urban, suburban, and agricultural landscapes. Nonnative invasive plants that have escaped from our yards further degrade natural habitat by reducing plant diversity. Diseases, parasites, and a changing climate all contribute to pollinator decline.

Exposure to pesticides is also part of the equation. In a 2007 study, Penn State found 121 different pesticides and metabolites in honey bee colonies. The samples included insecticides, miticides, herbicides, and fungicides. Certain pesticides, such as carbaryl (Sevin), and various synthetic pyrethroids can kill pollinators outright. Other pesticides can have sublethal effects, impairing a bee's memory and ability to return to the hive or suppressing the bee's immune system so she is more susceptible to diseases and pesticides. Pesticides in this category include some neonicotinoids used in systemic pesticides. Because these are poured on the root system and taken up by the plant, homeowners may feel they are safer for pollinators without realizing that the pesticide moves through all parts of the plants, including into the pollen and nectar.

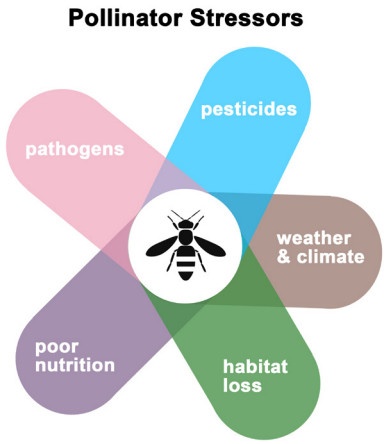

Figure 2. Need caption. Credit: Harland Patch

We can help pollinators by planting gardens rich in nectar and pollen. Credit: Connie Schmotzer

Plant More and Better Flowers!

Pollinators are hungry. Our lawns, landscapes, and agricultural crops that replace forests and fields often have little to offer a hungry pollinator. Just like people, pollinators need a diverse diet to thrive. Without good nutrition, all the other stressors are even more devastating.

That's good news to home gardeners who want to help our pollinator friends. Our yards and gardens can be a major part of the pollinator solution if we plant a diversity of trees, shrubs, and perennials with different shapes, colors, and bloom times.

Interested? Find out how to make your yard more pollinator friendly in the "Planting a Pollinator-Friendly Garden" fact sheet.

Sources

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