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Native Insect Pollinators and Their Habitats

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Insect pollinators are essential for producing fiber, fruits, and vegetables, benefiting both humans and wildlife. Two-thirds of all plants require insect pollinators to pollinate. Bees, butterflies, flies, wasps, moths, beetles, and even mosquitos unintentionally pollinate plants when searching for nectar and pollen on flowers.Bees are the only insect pollinators that collect pollen for food.As a result, bees account for 90 percent of global pollination. According to the Food and Agriculture Organization of the United Nations, 71 of the approximately 100 crop species that produce 90 percent of food supplies for 146 nations are pollinated by bees, the majority of which are wild native and unmanaged. Worldwide, bee pollination is the most valuable environmental service supplied by wildlife. Bees such as bumble bees, carpenter bees, sweat bees, metallic bees, orchard bees, digger bees, leaf-cutter bees, miner bees, cuckoo bees, mason bees, yellow-faced bees, and others can pollinate fruits and vegetables just as well as honey bees can. For example, one blue orchard bee (*Osmia lignaria*) can pollinate almonds more efficiently than 25 honey bees. For many tomatoes, bumble bees are 40 to 60 times more effective than honey bees, resulting in larger fruits. With a few exceptions, the contribution of native and no managed bees to pollination is not accounted for in the economic system.

Bumble bees

Bumble bees (*Bombus* spp.) belong to of the Apidae family and can be found in temperate locations worldwide. They are considered generalist foragers, feeding on a wide range of plant species. Adult bumble bees are often larger and stronger than other bees. Their entire body is often covered in dense black and yellow hairs, while other species have orange hairs. Bumble bees have rounded abdomen tips. Females have a modified stinger called an ovipositor. It is not barbed, so it can sting numerous times. However, bumble bees are generally not considered aggressive and only become an issue when their nests are threatened or disrupted, particularly if their nests are located near areas of high human activity. Bumble bees go through a complete metamorphosis and exist in four stages: egg, larva, pupa, and adult. A queen bumble bee, like a honeybee, lays both fertile and unfertilized eggs. The fertilized eggs hatch into females: either workers, which are sterile females with 8- to 16-millimeter bodies, or new queens, which are fertile females with 17- to 23-mm bodies. Unfertilized eggs hatch into males, which are fertile drones with bodies measuring 12 to 18 mm long. Bumblebees, like honeybees, are eusocial organisms. They live in colonies with members divided into castes, or subsets of individuals, according on the duties they do. For example, a bumble bee colony is led by a single queen. However, unlike honey bees, only a mated new queen hibernates over the winter. In the spring, the queen becomes active and begins looking for a suitable, protected nesting place. Such locations may be found in an underground cavity, such as an abandoned rat nest or an empty area beneath decaying tree roots; beneath a pile of vegetation, such as hay or straw bundles; or within hollows in decaying logs. After establishing a nest, the queen uses pollen paste to form a container-like

structure called a cell. She lays eggs in the cell and then seals the cell with wax. The developing larvae initially feed on the pollen paste. Later, the queen feeds them through a hole in the cell. Eventually, these individuals will emerge as workers and assume the responsibilities of constructing more cells and taking care of later broods. Workers use wax, secreted by their abdomens, mixed with pollen to construct oval cells in which nectar or pollen is stored. In other cells, the queen lays eggs (several per cell), and the workers feed the developing larvae honey and pollen. Bumble bee workers, like honey bee workers, forage for nectar and pollen. They have a wide flat device on their hind legs called the corbicula, which is used to capture enormous amounts of pollen on foraging trips. Workers live for approximately a month. Colony size varies by species and time of year. A nest can have between 50 and 400 bees at its peak population.

As autumn approaches, the queen transfers production from workers to reproductives and begins to deposit eggs that will generate drones and future queens, known as gynes. The drones and gynes will depart the nest a few days after they have emerged. Eventually, both the elderly queen and the last of the workers die. Mating among just emerging reproductives varies per species. Bumblebees do not swarm like honeybees. Bumble bee mating can occur near a nest hole while males await emerging females. In other circumstances, males may congregate around visual markers such as a flower, rock, or fence post and pounce on any passing females, or they may fly along certain routes looking for females approaching the area. After mating (sometimes several times), the new queen feeds excessively on pollen and nectar, storing the energy as fat within her body, and begins looking for a place to overwinter. In the spring, she will look for a suitable location to build her nest, and the annual cycle will repeat itself.

Natural habitats

Bumble bee populations thrive in habitats rich in coarse plants, natural waste, and rodent activity. Their nests can be located beneath plants or garbage, in hollow logs aboveground, or in cavities underground. They do not construct their own burrows, but instead seek out abandoned rodent tunnels to build nests. Nesting is best done in areas that appear untidy. In comparison to other bees, bumble bees have a long period of summer activity and a limited capacity to retain nutrients in their nests, so they require constant access to nearby food sources throughout the summer. Although they have been found to fly up to 10 kilometers (6 miles), the majority of their foraging occurs far closer to the nest. Bumble bees, like other bees, thrive in environments with a diverse range of flowering plants and a steady supply of water. As a nest grows, a bumble bee queen may have to visit up to 6,000 blossoms each day to obtain enough nectar to provide the body heat required to brood her eggs. The brood cools down while the queen is gone, so her foraging forays must be brief. As a result, the majority of nests are found near areas with a variety of flowering plants that bloom all summer.

Bumble bees are superior pollinators for some types of plants because they collect pollen in a unique way known as buzz pollination. During buzz pollination, a bumble bee rapidly vibrates its wing muscles while gripping onto the flower's pollen structures, allowing huge volumes of pollen to be released onto the bee's body. These vibrations more effectively transfer pollen from the blooms to the body of a bumble bee, which then transports it to other plants of the same variety. Some plants, such as those in the nightshade rose and heath families, require buzz pollination for optimal pollen transfer. Many crops, including blueberries, cranberries, tomatoes, and kiwis, benefit from buzz pollination, which increases yields.

Artificial habitats

Artificial bumble bee nest boxes are made up of two parts: a container and nesting material. The container can be made of wood, plastic, metal, or clay and come in a variety of sizes and shapes. It must have an entrance hole large enough to allow a bumble bee to enter and at least two ventilation openings to prevent moisture buildup inside. If the nest will be buried later, place a tube into the entrance hole to attract species that nest underground.The ventilation

openings should be covered with fine mesh to prevent other insects, particularly ants, from entering and destroying the nest during its early stages of development. A number of hollow containers can be utilized to create artificial nesting sites for bumble bees. The recommended volume for an individual nesting compartment is between 216 and 1,000 cubic inches, or 6 by 6 by 6 inches and 10 by 10 by 10 inches, respectively.

The finest nesting materials to utilize in the container are dried moss, upholstery stuffing, wool, horsehair, or old mouse or bird nest materials. Synthetic fibers and cotton stuffing should be avoided as they might entangle and kill bees. Place a wad of nesting material the size of a tennis ball inside the container, making sure it does not touch the container's sides and allows for air movement. Create a small depression in the ball, making it slightly concave on one side. Position the ball so that the concave side faces the nest entrance. Rodent droppings placed within nest boxes are frequently appealing to bumble bee queens. When the queen enters the hollow, she will begin to rearrange things slightly.

Bumble bee boxes should be installed in suitable locations by early spring. Different species have different nesting preferences, but the majority prefer places that are shielded from the wind and out of direct sunlight. Nest boxes can be put beneath sheds, plants, or trash, or buried in the ground. The success rate for using fake nest boxes each year is between 3 and 30%, so place more boxes than you think you'll need. The location of a nest box and whether mice have utilized it as a nest are frequently considered when determining its function. Being used by mice is often a good sign that a box is in a good location and that bumble bees will use it later.

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