Bees

Pollination – The Bees Second Shift

In addition to gathering nectar to produce honey, honey bees perform another vital function; pollination of agricultural crops, home gardens, orchards and wildlife habitat. As bees travel from blossom to blossom in search of nectar, they transfer pollen from plant to plant, thus fertilizing the plants and enabling them to bear fruit.

Almonds, apples, avocados, blueberries, cantaloupes, cherries, cranberries, cucumbers, sunflowers, watermelon and many other crops all rely on honey bees for pollination. The U.S. Department of Agriculture estimates that about one-third of the human diet is derived from insect-pollinated plants and that the honey bee is responsible for 80 percent of this pollination.

A 2000 Cornell University study concluded that the direct value of honey bee pollination to U.S. agriculture is more than $14.6 billion.

Understand Bee Biology's

Although bees are recognized as some of the most important pollinators in almost all ecosystems where flowers occur, their precise roles in pollination are not well documented (4). At this point, only a few species have been studied. Most wild bees, unlike honeybees, are solitary and don't form large colonies. Bumblebees form small colonies of one to five hundred workers, but most bees are independent, with the females producing and laying eggs in single cells. Many pollen bees hibernate for most of the year—up to 11 months. When they finally emerge, they pollinate with enormous energy (3).

The life cycle of most solitary bees fits into a regular pattern. Females make nests using leaves, soil, or mud, and provision them with honey and pollen. They lay single eggs in divided cells. The eggs hatch and the larvae eat, grow, and pupate inside the same cell. The adults remain in the nest until spring or summer. The males usually emerge before the females, which are mated immediately after emergence from the nest. The cycle then repeats itself.

Native Bee Species

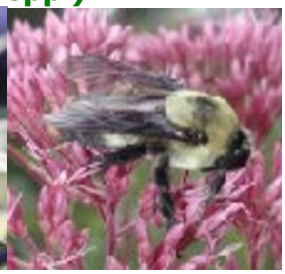
The information that follows describes some of the larger groups of native bees and how they can be managed for crop pollination.

Digger Bees (*Andrena, Colletes*, and other species)

Many ground-nesting bees are known as digger bees, mining bees, or sand bees. They excavate nests in the ground, leaving small mounds of soil aboveground. They often hide their nest entrances beneath leaf litter or in the grass (1). All digger bees are solitary, but some nest in dense aggregations. These bees pollinate a variety of plants. They are drab, solitary, and rarely noticed, yet they may be the most abundant wild pollinators in the field.

There are many species of digger bees found throughout North America. Most of these bees are known only by their Latin binomial names, although they are sometimes referred to as polyester bees. When the females build their nests, they line them with a polymeric secretion that looks shiny and synthetic. This material is waterproof, highly resistant to decay, and protects larvae while they are in the ground.

Bumblebees (*Bombus* spp.)

Bumblebees are highly social, like honeybees, but with smaller, less structured nests, consisting of one to five hundred bees. Bumblebees work harder, faster, and at cooler temperatures than honeybees (10). They prefer to nest underground, in undisturbed meadows, old barns and woodlots (7).

Sweat bees (Halictidae family)

Though most species of this small bee, found throughout the U.S., are black or brownish, some, such as *Agapostemon femoratus*, are bright metallic green. All species nest in the ground. Halictids have a range of nesting habits, from dispersed solitary nests to densely situated ones with individual bees sharing common entranceways to primitive social arrangements. Lateral tunnels end in a single cell. Halictid bees are common insects and good general pollinators (15).

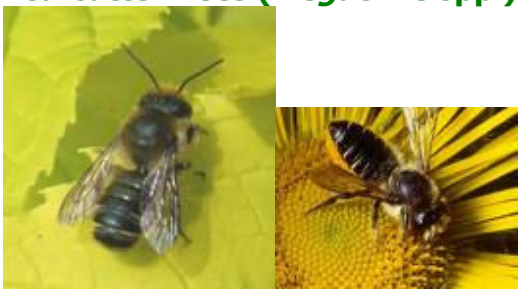
Alkali bee (*Nomia melanderi*)

The alkali bee was among the first of the solitary bees to be used for pollination of alfalfa in the western U.S. (4). This native bee occurs naturally in areas west of the Rocky Mountains (16) and nests in moist alkaline soils near natural seeps and springs (15). Western scientists and farmers attract this wild bee by building nests that simulate natural in-ground nests in alkaline soil. These nests are vertical and reach down a foot or two into the soil.

Squash Bees (*Peponapis pruinosa*)

Squash bees, which are related to carpenter bees, collect pollen and nectar only from the flowers of cucurbits (squash, pumpkin, and gourd). These solitary bees are found throughout the U.S., except in the Northwest (15). The bees nest in underground burrows. They become active at dawn, visiting cucurbit flowers until midday when the flowers close (4).

Leafcutter Bees (*Megachile* spp.)



Leafcutter bees are solitary bees, usually grayish in color, native to woodland areas (1). There are more than 140 species found in North America (15). They nest in ready-made wooden cavities, in hollow plant stems, and in drilled wood nesting blocks. The females cut pieces of leaves to line their nests. They can be rather particular about the leaves they use. One species, *Megachile umatillensis*, a bee native to the western U.S., cuts leaves only from an evening primrose (*Oenethera pallida*) (6).

Carpenter Bees (*Xylocopa* spp.)

Carpenter bees are some of the largest bees and have a blue-black, green or purple metallic sheen. They excavate their own nest tunnels in wood, rather than use pre-existing cavities, but they will re-use old nests. They burrow into dry wood pretty much anywhere they can find it, but they prefer softwoods like pine, and avoid wood that is painted or covered with bark (13). A nest consists of a round entrance hole (½" in diameter) and a tunnel back from it that can extend up to several feet. Carpenter bees become active when temperatures climb into the 70s in the spring. Mating occurs in April. Carpenter bees are longer-lived than most solitary bees (6).