

## Bee Hotel – Increasing the Pollination Efficiency

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Bee hotels, also known as nest blocks, bee condos, or bee houses, resemble birdhouses. These buildings serve as nesting grounds for certain solitary wasps and bees. Hotels run by bees will serve as helpful pollinator habitat replacements. Because solitary bees are lone bees, they do not reside in colonies. Masonry bees, leafcutters, mining bees, white-faced bees, carder bees, digger bees, and other solitary bees are among them. They guard their own nests and are inoffensive. Nests are made by solitary bees in hollowed-out reeds or twigs, holes in wood, or, most often, underground tunnels.

### The benefits of bees

Establishing a bee hotel is often done to support bee populations and the pollination services they offer. In both natural and agricultural environments, bees are among the most prevalent and efficient pollinators. Through their actions, plants multiply and produce the fruits and seeds that humans eat. For the purpose of producing seeds or fruit, about 87% of all flowering plant species and 75% of crop species require an animal pollinator (Ollerton *et al.*, 2011; Klein *et al.*, 2007). A lot of fruits, nuts, and berries which are high in nutrition and contain most of the vitamin's A and C in our diets need be pollinated by bees and other animals (Eilers *et al.*, 2011; Smith *et al.*, 2015).

### Materials for nest tunnels

Drilled blocks make a drilling hole into logs, branches or wood. It's quite attractive to nesting bees and wasp (González-Zamora *et al.*, 2021). Grooved boards are less attractive than drilled blocks or bundled tubes (Konigslow *et al.*, 2019; Dicks *et al.*, 2010; Sedivy and Dorn 2014). Observation nests it's deeply grooved board covered by a plexiglass viewing panel. see the real time activity of making of nest. Bundled tubes – variety of plant stems used for bundled tubes. Bamboo is popularly used because they naturally available one end is open another end is closed.

### Tunnel size

#### Diameter

Diameter of the nesting tunnel is depending on size of the species. Bees and wasps of all species will live in nest tunnels that are around the same diameter as their bodies, usually ranging from little more than 1/16 inch to 1/2 inch. Other sizes may be used by residents if they are unable to locate an ideal tunnel, although these nests often have lower success rates (MacIvor, 2017).



#### Length

Length of the nesting tunnel is depending on species. For example, Alfalfa leaf cutting bees reveals that the most productive nests are those that are two to three inches long (Stephen and Osgood, 1965). Blue orchard bees effectively used six inches nesting tunnels (Bosch and Kemp 2001; Seidelmann *et al.*, 2016).

### Shelter and protection

Shelters should overhang nest entrances by at least a couple of inches to protect from rain and bottom of the shelter provide drain holes, for avoid water accumulations (Staab *et al.*, 2018). Birds can destroy a bee hotel by breaking wood or nest open and pull out the tubes (Krunic *et al.*, 2005; Staab *et al.*, 2018). To come out this problem using the largest chicken wire over the bee hotel (Mader *et al.*, 2010).

### Shade and orientation

The orientation of the nest has a significant impact on its temperature. For example, temperatures in nest tunnels facing southwest might be up to 8°F (4.5°C) hotter than in equivalent tunnels facing northeast (Wilson *et al.*, 2020). The reasoning behind this is that nests facing south or southeast receive early morning solar exposure but are protected from the

afternoon sun's rays (Bosch and Kemp, 2001; Mader *et al.*, 2010; Richards 1984).

### Cleaning and maintenance

An unmaintained bee hotel vulnerable to parasites and diseases. Unwashed nests susceptible to fungal disease (chalkboard surged) one generation to next generation (Mader *et al.*, 2010; Stephen 1981). The fungus grows throughout the body of the bee larva, killing it and producing spores that can survive for years. Hairy-fingered mites can be a problem for mason bees. Inside the nests mite eat the pollen. The developing mites eat pollen provisions inside the nest. Developed mites damage bee eggs and larvae and eating their pollen (Park *et al.*, 2009; Krombein, 1962). Every one to three years disinfecting the nest materials for control of mite and fungal growth. (Park *et al.*, 2009; Kronic *et al.*, 2005; Bosch and Kemp, 2001; Pitts and Cane, 2011). Nesting materials soak in bleach solution (Richards 1984; Mader *et al.*, 2010; Bosch and Kemp 2001). frequently cleaning is essential to avoid the spread of parasitic mites and chalkbrood disease (Kronic *et al.*, 2005; Mader *et al.*, 2010).

### Navigation aids

Bees use polarized light and the sun to determine their direction when in flight. They use visual cues such as the amount of passing landscape to determine their distance (Hrncir *et al.*, 2003; Kraft *et al.*, 2011). When a bee leaves the nest for the first time, it takes a learning flight to help her remember landmarks (Guedot *et al.* 2005; Pitts-Singer and Cane 2011). (Dousot *et al.*, 2020). Certain bees might practice their learning flight every day, or more frequently if they are having problems locating their nest (Dousot *et al.*, 2020).

### Landscape features

Hundreds of journeys will be made by a female solitary bee between her nest and other resources. To gather enough pollen and nectar to nourish a single child, a bee species may require up to 50 journeys (Neff 2008), and an additional ten to twenty excursions to gather enough building supplies (dirt, leaves, etc.) to finish one brood cell (Rozen and Go 2015). The effort required to commute between the nest and other resources is multiplied by an average of two to fifteen

offspring (Bosch and Kemp 2001), indicating that a significant portion of a bee's life is spent traveling.

### Conclusion

Bee hotel is simple and man-made structure. Solitary bees and wasp effectively utilize the bee hotel for the developed her offspring. It can be increasing the pollination efficiency.

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