

BEE HOTELS: A SUSTAINABLE SOLUTION FOR POLLINATOR CONSERVATION

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INTRODUCTION:

Approximately 75% of the global agricultural production are highly dependent on pollinating insects. Eusocial bees & solitary bees, most butterflies, moths, ants, flies, beetles, and some thrips are the important pollinators. Bees play a crucial role in benefiting both the environment and agriculture. Bees are essential pollinators that play a predominant role in the production of food, including oilseeds, fruits, vegetables, and nuts. All bees are known pollinators, but the solitary bee is a proficient pollinator and is typically more effective than honeybees. Any of species, that do not live in a community are known as solitary bee. It includes leaf cutter bee, mason bee, carpenter bee, bumble bee, halictid bee etc.,

Unfortunately, bee populations have been declining worldwide due to factors such as habitat loss, indiscriminate pesticide use, and global climate change. Bees require two basic resources: food and nesting habitat. The diversity of pollinators and consequently, the rate of pollination are increased by a close vicinity of floral resources and nesting habitat. Making artificial nests is a possible strategy for conserving pollinators in rural as well as urban environments. They can protect bees from various threats and aid in boosting bee populations. Bee hotels have emerged as a valuable tool for bee conservation, by providing a safe habitat for bees.

BEE HOTEL:

Bee hotels are artificial nesting structures designed to provide shelter and breeding sites for solitary bees. Unlike honeybees, which live in hives, solitary bee nest alone and do not produce honey. Various bee species may build their nests in the ground, in plant

components like hollow stems or wood, or in a variety of other voids and cavities, such rodent tunnels or stone walls. These insects may actively create their own nesting tunnels, occupy pre-existing structures, or lay their eggs in the nests of other bees. At most 100 species, or 18% of the total, may be considered potential residents of the bee hotel. Bee hotels are not appealing to honey bees or bumble bees because they prefer larger cavities.



CONSTRUCTION OF BEE HOTEL

A bee hotel typically consists of a series of small tubes or holes that mimic natural nesting sites for solitary bees. The tubes can be made of materials like bamboo, drilled wood, or paper straws. Bee hotels exist in a variety of sizes, designs, materials used for construction and functions. Bamboo stems with different diameters can be tied into a bundle and make a simplest type of bee hotel or these stems can be loaded into the wood frame in the solitary bee hotel. To attract more solid solitary bee, frame or wooden box can be used. The box should be a minimum of 20 cm deep and open only from the front end (Fig. 1). Make a single pitch or double pitch roof to deflect rain. The outer structure and nesting blocks can be made from a variety of common wood such as pine, spruce, and oak. Mud brick walls also another option for attracting bees, especially blue banded bees.



Fig. 1: Bee hotel model for solitary bee

Nesting blocks mimic the holes in the trees that cavity-nesting bees will use in the wild. To attract as many species of bees as possible drill holes of varying sizes into the wooden blocks. In general, a good guideline for a bee hotel frame is at least 6 inches deep X 10 inches wide (Fig.2). Bee hotels include nests that have multiple holes or tubes. The effectiveness of bee hotels in attracting bees depends on the width of holes and the length of the tubes, neither of them can vary. The tubes range from 1.4 to 28 cm in length, with an average of 11.3 cm. These tubes have a diameter that ranges from 2 to 25 mm, on average 7.2 mm of these nests in attracting bees.

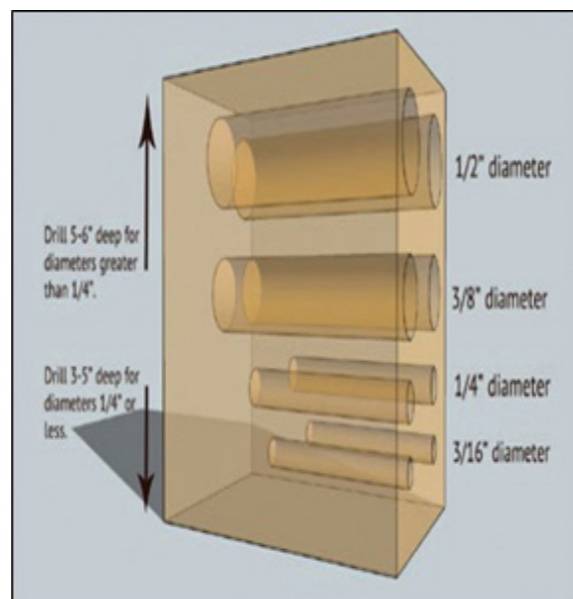


Fig. 2: Dimensions followed in Bee hotel

INSTALLATION OF BEE HOTEL

The hotel is usually mounted in a sunny area, such as a garden, wall, fence, or post, ensuring it is at least placed 3 to 5 feet off of the ground. The front of the bee hotel should have direct sunlight throughout most of the day. The landscape around the nests and climatic factors also affects the efficiency. A bee house must be firmly fixed, so that it does not swing or sway in the wind. One of most important things to consider is vegetation types near the bee hotel. keep the bee hotel close to the plants enriched with nectar and pollen such as sun hemp or *Crotalaria* sp., wing beans, long bean, *Tephrosia* sp.



UTILIZATION OF BEE HOTEL BY SOLITARY BEES

As the inhabitants of bee hotels are entirely solitary, each nest is “owned” by a single female, who lays her own eggs and gathers all the food needed for each offspring. A bee or wasp will modify the interior of a nesting area by lining it with leaf fragments or glandular secretions and constructs a distinct chamber for each egg. It provides adequate nectar and pollen in each isolated chamber to grow into a full larva and then a pupa, where the oldest offspring are located towards the back (Fig. 3). One egg and enough pollen and nectar for the embryo to grow into an adult are present in each chamber. The queen bee frequently uses more than one nest tube during the course of her life as she continues to construct new chambers and lay fresh eggs. Female eggs actually are laid in the back of the nest by the mother bee, whereas male eggs are laid in the front. Even though their eggs were laid last, males emerge first because they are smaller, shorter growth period. This makes enough space for their older siblings to emerge a few days later.



Fig. 3: Cross-section of solitary bee nest cavity



CONCLUSION:

Solitary bees are extremely helpful in pollinating crops and floral plants. Solitary bee populations can be increased by creating artificial nesting habitat. Creating bee hotels is an easy way to participate in meaningful environmental stewardship and help native and non-native pollinators. Bee hotels is an ideal method to aid in bee conservation efforts and develop resilient habitats in urban environments that promote the health of ecosystems as a whole.