Backyard biodiversity

Guide to bee hotels

Globally, the number of pollinators has decreased steadily. One of the ways we can help preserve these essential parts of our ecosystem is by providing more nesting spaces. Bee houses can provide some extra housing for above ground, tunnel nesting wild bees, if there isn't enough natural nesting for them. You don't need to be worried about stinging from wild bees that take up residence in your bee house.

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Above ground nesting bees will lay their eggs on a lump of pollen and nectar in the tunnel or cavity, with each egg separated by a wall of mud, pieces of leaves, or other materials. The eggs hatch into larvae, which then form cocoons before emerging as adult bees, usually the next year. While natural nesting is the best way to support native bees, if done right, artificial nesting can provide a boost to wild bees and be a fun and engaging activity.

DIY bee houses

Wood houses

Natural, untreated wood is best. If you want to paint the house, make sure you allow about a month for the paint to cure because the smell can repel bees. To promote sustainability, consider using recycled or waste wood. Avoid composite materials such as chipboard or particleboard, as they will disintegrate in the rain.

Container houses

These include items such as milk cartons, plastic buckets, and cut PVC pipes. When designing, make sure you poke a few air vents in the sides or bottom of the container to prevent mold and provide an overhang to protect the nest materials from rain. To promote sustainability, consider repurposing old containers that are adequately cleaned and dried to remove any smells.

DIY bee houses: types of nesting materials

The solitary bees that will nest in your bee house are cavity-nesting, meaning they build their nests inside available holes. Different bee species use different diameter nesting holes; mason bees prefer ≈ 8mm diameter holes, while summer leafcutter bees prefer ≈ 6mm diameter holes. Various size tunnels will allow you to attract a variety of wild cavity-nesting species!

Shown here are some nesting material options, use one type or a combination.

Plants with hollow or pithy stems that you can use as nesting materials are: Asters, Bee Balm, Phragmites, Cup Plant, Honeysuckle, Joe-Pye Weed, Raspberry/Blackberry, Sumac, Sunflower, and Wild Rose.

Natural reeds/pithy stems

- Natural, plant-based reeds/stems are best for bees.
- Reeds can be store-bought or harvested from nature. Just make sure you harvest responsibly!
- Reeds should open easily for quick removal of cocoons.
- Most reeds have a natural node to seal the back end. If they do not, make sure you close the back before placing them in your house - clay is a natural substance that works well.
- Avoid bamboo: Bamboo is difficult to open, which could damage cocoons in the process and is typically too large of a diameter for many cavity-nesting bee species.

Cardboard and paper tubes

- Paper tubes are the most economical choice.
- Lightweight and easy to open.
- An alternative is paper straws. Make sure you seal the back end of each straw before placing it in your bee house - clay is a natural substance that works as a suitable tube sealant.
- Avoid plastic straws: Plastic straws can't be reused, recycled, or broken down organically!

Wood nest blocks with paper inserts

- You can use untreated lumber or old tree stumps, standing snags, and downed logs that are at least 15 cm (6 in) thick.
- To attract a variety of species, drill holes of varying sizes – 2 to 10 mm (0.08 to 0.4 in) are ideal.
- Make sure to take a piece of sandpaper and smooth out holes.
- Drilled blocks don't open, which allows pathogens to take hold. Therefore, add paper inserts so you can harvest cocoons in the fall and replace the blocks every couple of years.
- Don't drill all the way through the block as holes must have a sealed back.

Reusable wood trays

- Require a bit of wood working experience to make on your own.
- Reusable year after year!
- Easy to open and clean each year.

Learn more about DIY bee house creation:

https://www.pacificbeachcoalition.org/diy-bee-house-recycle/

https://crownbees.com/blog/diy-how-to-make-a-solitary-bee-house/

Maintenance:

General timeline

Early Spring
Put out cleaned/ empty bee house

Spring
Put out cocoons from the previous year if you have them

Spring
Observe and enjoy!

Late Spring/Summer
See them hatching/ eating/pupating (if you have a peek-a-boo design)

Fall/Winter
Remove cocoons, clean cocoons and house, and store

Storing and cleaning instructions

Annual maintenance is crucial in fall (autumn)/ winter! Think of a cow barn full of cows that was never cleaned. It'd be full of feces, parasites, diseases, and sick cattle. There are many ways to clean wild bee houses and cocoons, but for mason bees, here's one method:

1. In the fall (your season of plant and bee rest), bring the houses into your house or wherever you will be doing the cleaning. A kitchen table or counter should be enough space.
2. Prepare a large bowl or bucket with approximately 4 litres (1 gallon) of warm water and 15 ml of bleach (1 tablespoon).
3. Remove your paper tunnels and open your wood compartments, or crack open your reed tunnels (how you do this depends on the kind of structure you have).
4. Use a chopstick or wood doweling (many things work) to gently push or scrape out the cocoons into the warm water with bleach.
5. Use your hands to gently agitate the cocoons and gently rub off dirt, parasites, and other debris from the outside of the cocoons.
6. Once the cocoons are clean, the live cocoons will float on the surface. Scoop these up with your hand and transfer to a sieve.
7. Rinse the cocoons in cool running water. Cocoons are quite hardy and this minor exposure to bleach and rinsing does not harm them.

When bees turn from larvae (worm-like creatures) and pupate, they create 'cocoons'. These cocoons need to be removed from bee houses and tunnels and stored over the resting season.

8. Lay the cocoons out to dry on a dish towel.
9. After 20-30 minutes, when the cocoons appear dry on the outside, transfer to a sealable container with air holes.
10. Place in a cool location for winter e.g., your fridge, an outdoor shed, or a garage. If they are somewhere where mice, rats, or other predators can access, make sure they are in a container that will keep them safe.
11. Soak the housing structure in a warm bleach solution (about 50:1 water to bleach) for about 30 minutes, scrub, rinse well, and store for the winter.

For more information about proper bee house design and maintenance see
https://crownbees.com/bee-knowledgeable/

Buying a bee house

Many bee houses offered at stores are not properly designed. Since most cavity-nesting native bees lay their female offspring in the back of the tunnel and their male offspring at the front, a tunnel that is too short can result in a disproportionate number of male offspring. Also, short tunnels make it easier for predators such as birds to get many of the bee offspring. Some houses have tunnels that are far too wide to be used by any native bees and invite pest species such as social wasps. Bee houses with too many nesting sites in one structure can provide a buffet for predators and a breeding ground for parasites and diseases. Furthermore, most bee houses in stores are not designed to be cleaned. So, when buying a bee house, make sure the structure has these components:

- Tunnels can be cleaned (paper, cardboard, reeds, modular trays).
- Tunnels are long enough (at least 15 cm).
- Tunnels are not too wide (9 mm or less).
- Structure can be firmly secured (not swinging).
- Structure has protection from elements (roof).

Location and installation

Whether building or buying your bee house, location and installation are important. Houses should be:

- Mounted to a solid object (like a post, house, or fence). Bees don't like swinging in the breeze!
- Placed in a location facing direct sunlight in the morning. They are cold blooded and need the morning sun to start moving.
- Near flowers and a mud-rich clay. Many wild bees only fly about 100 m (330 ft) searching for nectar and pollen, and some species, like mason bees, use mud-rich clay to build their nests.
- At eye level ~1-2 m (~2-6 ft) above the ground, without any vegetation blocking the entrance. The elevation protects them from predators.
- Placed on balconies, up to 10 storeys, will still attract bees, especially if you have flowers on your balcony.
- In an area kept free of pesticides that are harmful to bees.

A bee house should be both firmly secured and have a roof to protect it from the elements.

About Pollinator Partnership

Pollinator Partnership is the largest nonprofit in the world dedicated exclusively to the protection and promotion of pollinators and their ecosystems. Their mission is to promote the health of pollinators, critical to food and ecosystems, through conservation, education, and research. Please visit the **Pollinator Partnership website** to find out more and support their work. Thanks to Pollinator Partnership for their expertise in producing the AXA XL Backyard Biodiversity resources.

Here's what else you can discover in the AXA XL Backyard Biodiversity toolkit:

Learn about pollinators and the threats they face by visiting **Meet the pollinators**.

Find out how to support pollinators and other native wildlife in **Growing plants for pollinators**.

Get to know the most common pollinators and native pollinator plants in your local area through the **Identifying pollinators guide**.

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