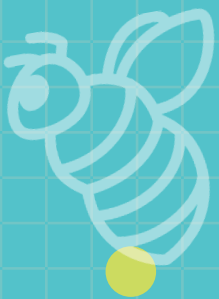


Making a Solitary Bee Hotel

Learn to make this easy project that can help Pennsylvania's more than 437 species of bees have a dry and safe place to build their nests!



INTRODUCTION

Bees visit flowers to collect nectar (a source of sugar) and pollen (a source of protein and fat) to bring back to their nests to feed to their babies. While they are visiting flowers, they also move pollen between flowers. This is important for the flowers to make seeds and fruit. Bees help make many of the fruits, vegetables and nuts that we eat. These include apples, tomatoes, and pumpkins.

There are more than 437 bee species in Pennsylvania. These bees come in many different sizes, shapes, and colors. When people think about bees, they usually think of honey bees. Honey bees live in large colonies, with up to

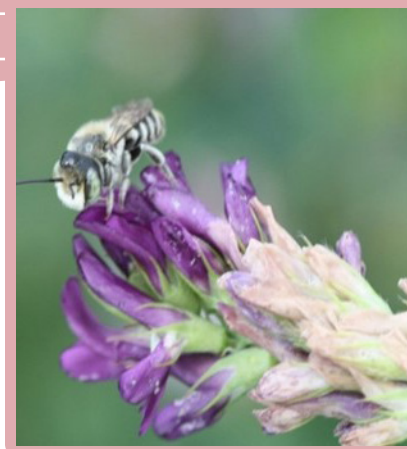


50,000 individual bees. In honey bee colonies, there is a single female queen who lays all the eggs. Her daughters (the workers) collect food to feed the larvae that hatch from these eggs. However, most of the bees in Pennsylvania (and the world) are solitary. This means a

single female builds a nest, lays the eggs in the nest, and provides the food for her young.

Solitary bees can make their nests in the ground, in the stems of plants, in trees, or in wood in your houses. About 70% of solitary bees live underground, in tunnels they either find or dig for themselves. About 30% of solitary bee species live above-ground in cavities. Some of these species, such as *Osmia* bees (also called orchard or mason bees), will build their nests inside hollow tubes. In the wild, these tubes are from the stems of plants. However, we can also provide tubes for these bees in “hotels” in our backyards.

Bee hotels can vary widely in size and shape. Below, we provide information on how to make and care for a bee hotel that will keep cavity-nesting solitary bees happy, dry and safe. You can also help bees in your yard, neighborhood, or school by growing more flowering plants, using less insecticides, or leaving some part of your garden wild and weedy.



Bees we see on flowers reveal only one small piece of their full life cycle! Bees hatch from eggs laid by their mom and begin eating and growing as plump, wiggly larvae. Once they reach the right age and size, they change into pupae, which is the stage where the adult body plan, complete with wings, legs, and specialized mouthparts develop. Bees pupate in secret, hiding inside a dark, small cocoon until they are ready to emerge as free-flying adults. Most bees live for just one year and about 10 months of that year are spent as larvae and pupae. The adults, which mate and forage on pollen and nectar for their young, live just 6-8 weeks. This short adult lifespan will be apparent as you watch your bee hotels – you will notice that different bees will visit your hotel throughout the spring and summer.



MATERIALS

- [3 inch diameter PVC pipe, cut to 8 inch length](#)
- [3 inch PVC pipe endcap](#) (less expensive [test caps](#) also work, but may need to be secured with hot glue)
- Phragmites reeds, cut to 6-inch length
 - Approximately 40 are needed for each hotel
 - Phragmites is a 12 foot tall perennial grass found in wetlands and ditches, and is invasive in Pennsylvania. You can probably find some close to where you live.
- [3 inch plastic J-hook](#)
- Rubber bands
- Scissors
- A hammer
- **Optional:** [A 3" PVC bracket](#) and screws can be used to connect your hotel to an awning, on the siding of a house or on a wooden post in place of the J-hook. You will probably need two for each hotel so that it doesn't wobble.
- **Optional:** outdoor acrylic paint, if you would like to decorate your bee hotel. You may find that the paint adheres to the plastic a little better after some light sanding of the PVC.



MAKING YOUR BEE HOTEL

1. For this project, we have already secured the PVC test cap on to one end of the PVC pipe using a hot glue gun. Then, we sealed the plug in further using paraffin wax to make sure that parasitoids or other pests wouldn't be able to wriggle into any cracks left at the back end of the hotel.

2. **Optional:** If you want to decorate your PVC bee hotel, use some outdoor acrylic paint or other craft materials. If you choose to do this step, wait at least 7 - 10 days before hanging up your nest. The bees will not be attracted to the smell of the paint, so it will need some time to 'air out' first.

3. Wrap two rubber bands around the reeds that you want to fit inside your bee hotel.

- The reeds all have one 'open' and one 'closed' end. Make sure that all of the reeds are pointing in the same direction so that the bees are able to crawl inside!





4. Place the flattened side of the bundle in toward the 'back' of the solitary bee hotel.

- The reeds need to be flush on the back end so there is less space for predatory flies, wasps or beetles to sneak into the back of the nest to attack the developing larvae.
- Make sure that the reeds are pointing the right way, with the open end facing the entrance.
- There should be 1-2 inches of space between the longest reed and the end of the pipe. This way, the reeds will be protected from the rain when they are outside, and birds will be less likely to prey on the bees.

5. With the help of an adult, use some scissors to unseal and remove the nails from your J-hook. The nails are designed to slide into the holes on the 'staff' of the J-hook.

6. Snap your bee hotel into the curved end of the J-hook. You will hear it 'click' into place.

7. **Now it's time to hang your bee hotel up!**



PUTTING UP YOUR BEE HOTEL

1. Look for a good spot to put your hotel.

- The best place to put your hotel is 3-4 feet above the ground with sun exposure and a south-east facing entrance.
- Try to find a spot that is within view of your window, deck, or patio so you can observe the bees as they visit your hotel throughout the spring and summer months.

2. Secure your hotel in a safe location.

- There are a couple ways to secure your bee hotel using the J-hook (pictured). With the help of an adult, use a hammer and nails to affix your bee hotel to a wooden structure of your choice.
- Make sure that the hotel is not tilted with the entrance facing towards the sky, or else rainwater will pool in the bottom of your hotel and invite mildew and mold. Some bee hotel managers like to tilt their hotels down, ever-so-slightly, for drainage.

3. Wait and watch!

- Now is the time to be patient and wait for the bees to move in. It may take a couple of weeks for the bees to find their new home.
- You will notice that different bee species will use different sized reeds and different materials to construct their nests over time.
- If after a couple of months, you are not noticing any activity at your hotel, consider relocating the hotel to a new spot.



MANAGING YOUR BEE HOTEL

1. Make sure to put your hotel (and any cocoons you might collect) out at the right time and in the right weather for the bees to be able to build nests and feed their larvae.

- During the winter months, almost all bee species enter diapause, which is like an insect version of winter hibernation.
- Bees are active in Pennsylvania from April through October, so you should try to place your hotel outside in April.
- If you have bee cocoons from the previous year, or purchase bee cocoons from a local nursery or supplier, plan to release them at a time that makes sense for their biology.

2. Collect your reeds individually, as they are filled.

- Between April and October, check the reeds in your hotel every 1-2 weeks for completed nests. A 'nest' refers to a reed that a female bee has laid eggs in! You will know if the nest is 'complete' because the bee that built it will construct a plugged seal at the front of the reed, which is typically made of soil and/or leaf tissue. When you see this seal, you know the bees is finished laying her eggs.
 - Carefully remove the completed nests from your hotel as you see them, and store them in a safe place away from predators, pests or parasites (for example, inside an unheated garage or shed). Do not bend, break or tilt the nests as you collect them. These nests contain delicate baby bee larvae, who will slowly eat the pollen and nectar masses that their mom provisioned for them. They will grow slowly, sometimes over a period of months, before they are ready to be handled. Try to keep track of which day or month you collected each nest so you can anticipate when they will be ready to emerge as adults the next year.



MANAGING YOUR BEE HOTEL CONT'D.

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THANK YOU FOR HELPING THE BEES!



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