

# Building and Installing Bumblebee Houses

Each spring in Alberta, millions of queen bumblebees wake up from hibernation, shake themselves off, and begin looking for potential nesting sites. Like you or I, the queens prefer to make their homes in places that are dry, protected from the elements, and near to good sources of food. Depending on the species, such places can be found under piles of rock or deadfall; in the hollows of trees, thick bunch grasses, or abandoned rodent burrows; or in a well-designed, properly installed bumblebee house!



Figure 1. A typical bumblebee nest. Photo credit: Mark Wonneck.

The following factsheet describes how to build and install bumblebee houses that would be difficult to resist for any passing queens.

## Materials to Build One Bumblebee House

- ¾ inch plywood (approximately 2½ square feet)
- Saw to cut plywood to size
- Sixteen 1½ inch screws
- One hinge
- Four ½ inch screws (for fastening hinge)
- Latch and 2 eyehole screws
- Approximately six inches of plastic pipe (PVC or similar material), with interior diameter of 5/8 inch (ideally) or 3/4 inch. *\*\*Note that plastic pipe is not necessary if you are planning on installing your house aboveground.*
- Pruners
- Drill and/or screwdriver
- Drill bit for making an entranceway hole. If you are not using a plastic pipe (for aboveground houses), the hole should be 5/8 inch. If you are using a plastic pipe (for belowground houses), the hole will need to be slightly larger to accommodate the outside diameter of the pipe.
- Approximately 6" x 12" of bedding material such as upholsterer's cotton, or non-surgical white bleached cotton (e.g. Kendall Lakeside cotton)
- Approximately 10½" x 10" of plastic sheeting, at least 4 mil thick
- Staple gun and staples

## Building Steps

1. Cut plywood into appropriately sized pieces for a box with 6" x 6" x 6" internal diameter, an overhanging lid, and two skids, as follows:
  - One 8½" x 8" piece (lid)
  - Two 7½" x 6¾" pieces (front and back)
  - Two 6¾" x 6" pieces (sides)
  - One 6" x 6" piece (bottom)
  - Two 7½" x ¾" pieces (skids)
2. If you are installing your house belowground and using a plastic pipe: Use the pruners to cut your plastic pipe to a 6 inch length. Cut one end at 90° and the other end at a 45° angle.
3. Drill a hole into the center of the piece of plywood that will become the front of the house.
  - If you are installing your house aboveground and not using a pipe: The hole should be 5/8 inch in diameter.
  - If you are installing your house belowground and using a pipe: The hole should be large enough for your plastic pipe to fit in snugly, and should be drilled at a slight angle (10-15°) so that the pipe angles downward away from the house. This will prevent water from draining into the house.
4. Screw together the front, back, sides, and bottom pieces together using the 1½ inch screws, to make a basic box shape.
5. Screw the skids onto the bottom of the box using the 1½ inch screws.
6. Using the ½ inch screws, screw half of the hinge on the back edge of the lid (on the underside surface) and then screw the other half onto the top edge of the back side of the box (on the back-facing surface). See Figure 2.
7. Screw the eyehole screw and latch into the front edge of the lid (on the underside surface) and screw the other eyehole screw into the front side of the box where the latch can fit into it snugly.
8. If you wish, at this stage you can apply a coat of outdoor paint to the outside of the house (DO NOT PAINT THE INSIDE OF THE BOX), as this will make it more weather resistant. Note that bumblebees are sensitive to the smell of paint, so painting should occur a few months before installation.



Figure 2. An almost completed bumblebee house (only the plastic covering is missing). Photo by AWES.

9. Fold the 6" x 12" piece of cotton and place it inside the box so that the fold is against the back wall. Ensure that there is a gap between the layers of cotton at the entrance hole (this will allow the queen bee to burrow in between the layers and make her nest).
10. Drape the 10½" x 10" piece of plastic sheeting over the lid so that it overhangs it by about an inch on all sides. Staple it to the lid.
11. *If you are installing your house belowground:* Insert the plastic pipe into the entrance hole so that the straight cut side is flush with the inside of the front piece of plywood, and the 45° angle cut side is rotated to create a "landing pad" for the bees. If the hole is too large and the pipe is loose fitting, it can be sealed into the hole with some caulking.

## Installation

Bumblebee houses should be installed in early spring (i.e. April), right after snowmelt but before leaves appear and early flowering species (e.g. willow) begin blooming. For the best results, install the houses in areas with plentiful sources of food for the queens (i.e. pollen and nectar from diverse



**Figure 3. A belowground bumblebee house before (top picture) and after (bottom picture) being buried by sod. Photo credit: Mark Wonneck.**

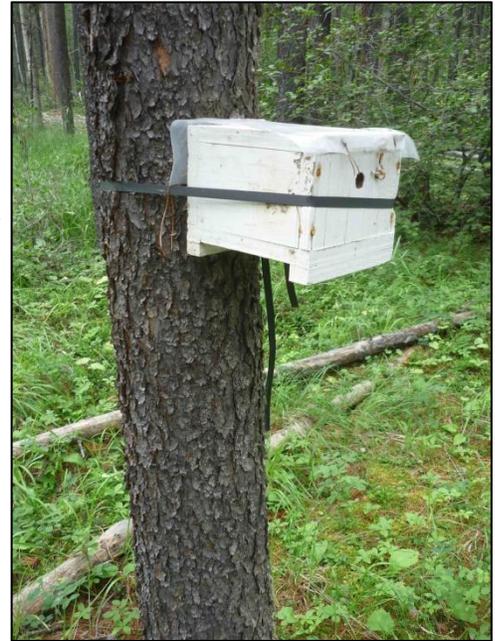
flowering trees, shrubs, and forbs). Avoid sites that are within 3m (10') of anthills, or at risk of being sprayed with pesticides or vandalized.

Certain species of bumblebees prefer to nest aboveground, often in the hollows of trees, and are therefore more common in forested areas. Other species prefer belowground nests, typically in rodent burrows or under piles of brush, and are more common in open areas. For these reasons, houses that are installed aboveground may experience higher nesting rates in areas within or surrounded by forests, while houses installed belowground may experience higher nesting rates within and around open areas such as pasture or cropland.

As discussed above, houses that are installed belowground should have a 6" piece of plastic pipe inserted into the entrance hole. Belowground houses should be partially buried into the side of a well-drained gradual slope, with the pipe angling slightly down the slope to ensure that rainwater does not drain

into the house. The house and pipe length should be covered with a piece of sod so that only the very end of the pipe is exposed. Further tips on belowground house placement include:

- Avoid exposed south or west-facing slopes, as the sun may cause the end of the plastic pipe to heat up beyond what is comfortable for the bees.
- Clear obstructing vegetation away from the area directly in front of the pipe entrance upon installation. Once the house has been installed, vegetation should be left to naturally grow around it. By the end of the season the house may be difficult to find amid the vegetation, so it is a good idea to take careful notes of where you installed it or place some flagging to help you find it again in the fall!
- If possible, select a site that has a visible landmark nearby, such as a large tree, rock, or building. This will help to orient the bees to the site.



**Figure 4. An aboveground bumblebee house.**  
Photo credit: Dr. Ralph Cartar.

Bumblebee houses that are installed aboveground do not require a 6" piece of plastic pipe in their entrance hole. These houses can be strapped to a thick tree or post using plastic or metal strapping, or simply set on the ground. The north side of trees/posts is ideal, so that the house is not exposed to direct sunlight.

## Monitoring and Maintenance

Once your house is installed, the only thing left to do is wait and see whether it is used by the bees. Queen bumblebees are quite selective about where they nest, and an average of only 1 in 4 bumblebee houses are colonized even where there are ample food resources (which is why it is often a good idea to build multiple houses!). To tell whether your house has been colonized, monitor the entranceway for bees coming and going. It is also possible to open up the lid at night when the bees are inactive – however be careful not to do this too often as it may disturb the bees and put you at risk of being stung. If there are no signs of bee activity by mid-July, the house is likely not going to be inhabited for that season and can be removed from the site, cleaned if necessary, and stored for next year.

If a queen does happen to choose your house for a nesting site, she will crawl into it, fluff up the cotton inside, and begin creating wax cells, laying eggs, and provisioning them with nectar and pollen. The eggs will hatch into "worker" daughters that help with the provisioning and guarding of the nest, and over the season the colony may expand to 50-400 individuals depending on the species and habitat quality. At some point in mid-summer, the queen will begin laying eggs that hatch into males and new queens, both of which will fly out and mate with bees from different nests. By mid-October, the old nesting site will be abandoned, and all the bees will die off except for the newly mated queens. These queens will build up their fat reserves by feeding on nectar and pollen, and then find a sheltered spot to hibernate for the winter (e.g. within leaf litter or in the soil). Figure 5 provides an illustration of this lifecycle.

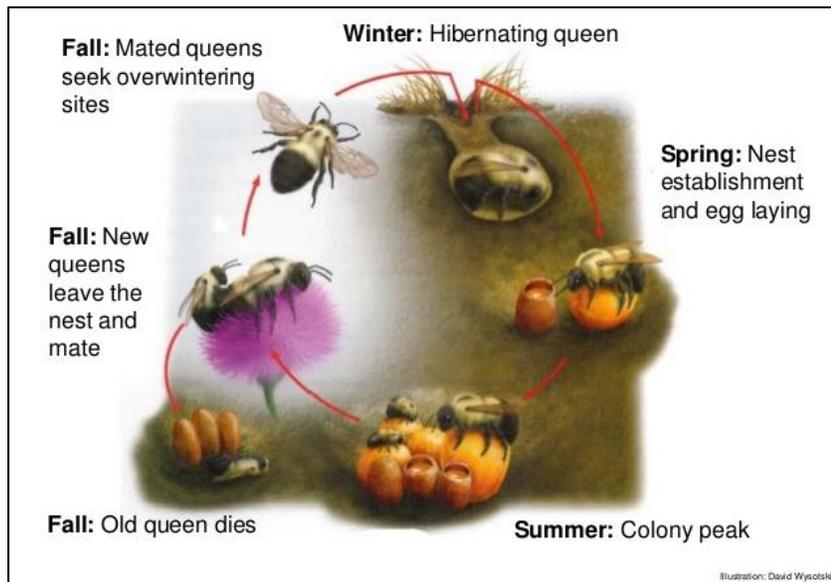


Figure 5. The lifecycle of a bumblebee colony. Photo credit: Xerces Society.

This means that by mid-October, it is safe to open up the house and inspect the nest. Count the number of wax cells within the nest – this will tell you how large the colony was, and is a good indicator of habitat quality. Remove the cotton and nest material and clean out the inside of the house with a mild bleach solution. While aboveground houses can be left out over winter, belowground houses weather more quickly and should be stored somewhere dry until they are reinstalled the following spring.

## References

Personal communication, Dr. Ralph Cartar and Mark Wonneck.

Pelletier, L., and Cartar, R., 2016. Advice for deploying bumble bee nest boxes (domiciles).

<http://blogs.ubc.ca/theecoartincubator/files/2016/05/Pelletier-Cartar-Domicile-Instructions.pdf>

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