

“Owners of dogs will have noticed that, if you provide them with food and water and shelter and affection, they will think you are [a] god. Whereas owners of cats are compelled to realize that, if you provide them with food and water and shelter and affection, they draw the conclusion that *they* are gods.”

-- Christopher Hitchens

Why do bees need water?

All living creatures need water: some more, some less. Aside from the normal biological processes that require water, bees need it for a number of reasons.

1. Bee eggs ideally need 90-95% humidity in the cell to hatch. Too low or too high humidity reduces hatching success.
2. Bee brood requires a temperature of around 95°F to develop properly. To regulate the temperature, bees spread water on hive walls and place it inside cells. They fan their wings to evaporate the water, which cools the hive and also raises the humidity.
3. Brood food is 55-80% water.
4. Honey must be diluted to be easily consumable by bees. They add water to dilute it to 50% moisture.

All together, a strong hive needs about 250 mL (about one cup) per day; on a hot summer day it may need as much as a liter (about 1 quart). That’s as much as a small dog needs.

Note that much of a hive’s water needs are related to brood rearing. So bees lined up around a birdbath on a hot summer day are a sign suggesting that all is well with the hive: the queen is laying and brood are being tended.

Sources of water

Where do bees get all that water? A major source during blooming season is nectar, which is typically 50 to 60% water. The act of drying nectar to make honey helps with the need for humidity and evaporative cooling, and nectar is pre-diluted for consumption.

Another source, particularly in cold weather, is natural condensation. The heat



Bees flock to a whiskey barrel water garden.

generated by bees causes moisture-laden air to release water. In winter, this can accumulate on the inner cover to the point that it can rain down on the inside of the hive. That’s one reason why it isn’t wise to make hives too warm and snug in winter.

Additional water is collected by bees in the same manner that they collect nectar. Certain bees are water-collectors. They scout for it and recruit other water-collectors as needed. Instead of storing it in cells to use later, some bees act as water reservoirs. These “tanker bees” accept water from foragers, swelling up as they are given more and more. Overnight, when no one is foraging, they provide the hive with their stored water so that normal activities can continue (humidity regulation, honey dilution, etc.).

Why think about water?

There is no question that we have been blessed with abundant water in North Carolina. I doubt there is any place in the state that isn’t within a mile or two of a stream, pond or other body of water. However the existence of water isn’t our only consideration. We also want water that is:

- Convenient for the bees: Effort spent searching and foraging for water is effort that they could be using for something more productive, such as nectar foraging.

We want an easy-to-access supply within a short flight range.

- **Constant:** A nice little pond isn't any good if it dries up in July.
- **Safe:** Bees, like some dogs, prefer nasty water. An oozing, bubbling puddle behind a toxic waste dump may seem like a wonderful watering hole to a bee, but you may disagree.
- **Neighbor friendly:** Believe it or not, the law says that people are more important than small stinging insects. If your bees flock to your neighbors' swimming pools, hot tubs and bird baths, you are unnecessarily creating ill will among the public. Your neighbors have more right to enjoy their private property than you have to pursue your hobby, if your hobby infringes on their property. Be a responsible beekeeper and don't create an incident waiting to happen.

What do bees want?

Bees locate and select water sources in four ways:

- by sight
- by perceiving the water-vapor content of the air
- by "smelling" substances in the water
- by taste

Experiments conducted by C.G. Butler¹ explored the characteristics bees prefer with respect to their water. He found that bees chose distilled water over most of the salt-enhanced solutions he tested except for a slightly salty NaCl solution. But of all the choices Dr. Butler provided, water from leaf-filled gutters and the water that collects in sunken cow pies were much preferred over any artificial solution he could concoct. He tried to isolate exactly what element made nasty water so appealing but was unable to do so.

The bottom line from Dr. Butler's research is that any reasonable source of water

will do fine for bees; we don't have to give them Perrier. It also showed that when offered a side-by-side choice, bees will go for slightly salty and aromatic water over pure, unadulterated water. This explains why swimming pools and cow pie water are so attractive. However convenience is more important than composition.

Ways to Provide Water

The number of ways to provide water to bees is limited only by our imagination. A few popular methods include:

- Allow a leaky faucet to drip onto a board
- Provide a water-filled bucket with some sort of float (Styrofoam peanuts, straw, etc.) to reduce drowning
- Install a Boardman feeder filled with water instead of sugar syrup
- Set a chicken waterer in the bee yard
- Make a water garden in a whiskey barrel
- Make a full-fledged water garden with fountains, waterfalls etc.

My favorite method is a water garden. Mine is constant, safe, out of the way and more convenient than the neighbor's swimming pool. A waterfall creates moving water that attracts bees and deters mosquitoes. A variety of aquatic plants provide ample footholds that prevent drowning (parrot feather is excellent for this purpose). My water garden also does double duty as an attractive, tranquil landscape feature!

Reforming wayward bees

Bees are efficient creatures. Once trained on a bountiful supply of water or nectar, they remember that source and don't search any further. They'll even remember their fall sources over the winter months, returning to them once spring returns. This is why it is important to ensure a constant water supply from the outset.

Once bees have targeted the neighbor's swimming pool, it is difficult to untrain them. The best hope may be to place a kiddy pool,

¹ C.G. Butler, "The Choice of Drinking Water by the Honey Bee", *Journal of Experimental Biology*, vol. XVII, No. 3, July, 1940.



A natural stream is a great water source.



The same stream during the mid-2000s drought. Where will our bees get water now?

large tub or other container in the flight path directly between the hive and the off-limits water source. Ideally, fill it with water from the taboo pool. There must be enough water to lure the bees and distract them from their intended target. Once the bees have discovered that this source is even more convenient and therefore more desirable than the original, you can move it in small increments to a permanent location. This new source must be constantly available or the bees will return to the old one.

Don't Forget!

Is it mandatory that beekeepers provide an artificial water source for their bees? No, but to be a good beekeeper, we must be aware of where our bees are getting water even if we aren't directly providing it. If the source is inadequate, we should take care of the issue. Keeping bees requires an interaction of a variety of factors. Water is one that is important but often forgotten!

Randall Austin is a NC Master Beekeeper who keeps a few honey bee hives in northern Orange County. He can be reached at s.randall.austin@gmail.com.

Copyright 2014, no reproduction in whole or in part without permission of the author.