The Traveling Beekeeper

The First Year: The Bees Determine the Beekeeper's Year

by LARRY CONNOR
Wicwas Press
1620 Miller Road, Kalamazoo, MI 49001
LJConnor@aol.com • www.wicwas.com

Individual bees have life spans with ever-changing duties as they age. Entire colonies of honey bees have annual cycles that are influenced primarily by climate and rainfall. In temperate regions climate is largely controlled by the seasons regulated by changes in day length and temperature. At extremes from the Equator the tilt of the earth produces shorter and colder weather in winter and longer and warmer conditions in summer. This relationship for temperate region beekeepers may be summarized as:

Day length → Climate → Flowering Patterns → Bee Activity

Bees and beekeepers closer to the Equator are mostly influenced by rainfall amounts, so they may be expressed as:

Climate → Flowering Patterns → Bee Activity

Successful beekeepers follow the bee's cycle. Knowing what influences bee colony development is critical. Attempts to drastically change bee behavior off season have been generally unsuccessful because the bees are genetically programmed to follow the seasons. Feeding bees in the late fall and early winter goes against the normal cycle, yet the bees benefit by having more resources in the hive before winter begins.

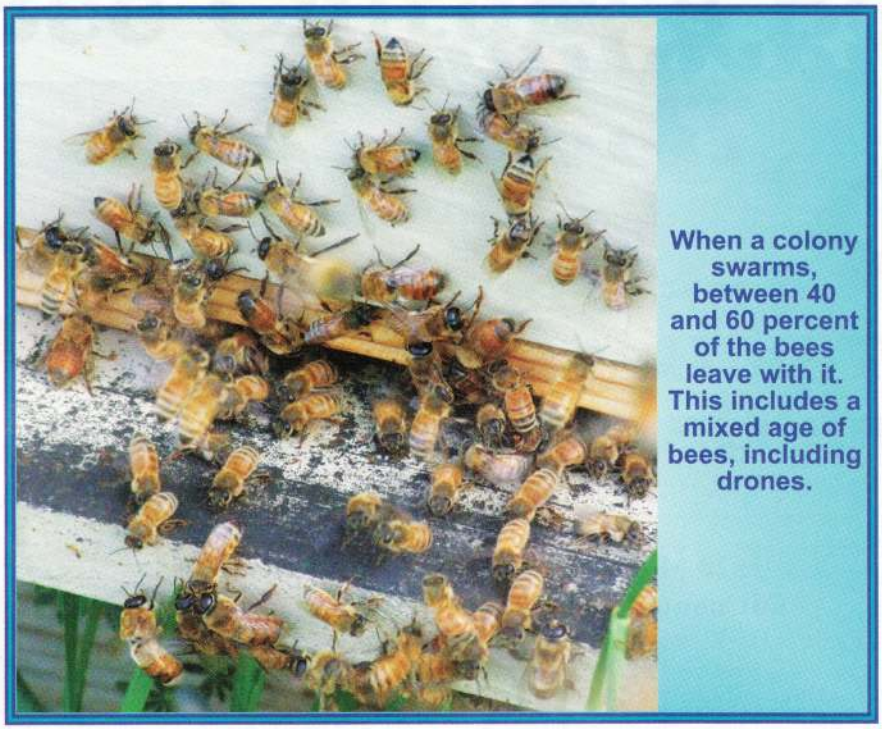
Spring Buildup and Swarming

When I see the first bee of the season in February or March in Michigan, I realize that bee was probably an egg-larva-pupa the previous September or October. This worker bee has an amazing story. Nurse bees reared in late summer are the bees foraging as winter becomes spring. Though many older bees have died, they helped keep the colony heated during the depths of winter. Our foraging bee worked during the winter months, when it was snowy and cold outside the hive, to keep the colony warm and to produce new bees. There were not a lot of new bees produced in January, maybe a few dozen eggs per day, but by February the queen bee was fed more stored food and stimulated to lay eggs, maybe a few hundred eggs per day, more and more each week. By late March a colony is producing about a thousand or more new eggs a day, which translates into a thousand new bees emerging every day. Think about it: a healthy colony may add seven or more thousand workers a week during March—in part due to the increasing day length, consumption of stored pollen and nectar, and the first taste of fresh pollen and nectar for the season. At this time of year, if the food supply is cut off by cold weather, strong colonies die of starvation.

By late April and early May, there is a dramatic increase in the amount of food available for the bees to gather. Early fruit bloom has started, or will soon. The queen is at her maximum egg-laying rate, 1500 eggs or more per day. This results in nearly a pound of new bees every two days—a remarkable reproductive rate for this social group of insects.

The colony in spring has two genetically influenced instinctual goals. First, they must produce a crop of honey to survive for another year—the bees produced in the late spring and early summer will gather the nectar and pollen from flowers necessary for honey production. Second, as a social unit, the colony has a strong instinct to reproduce

Moderate sized winter cluster in February. Beekeepers must take any opportunity possible to provide food in the late winter and early spring in areas where bees are unable to forage successfully nearly every day.



When a colony swarms, between 40 and 60 percent of the bees leave with it. This includes a mixed age of bees, including drones.

itself and split, like a single-celled amoeba, creating two 'cells' or colonies where once only one existed. The new unit is called a swarm, and some colonies produce more than one swarm per season.

As an abundance of pollen and nectar, carried by the foragers, flows into the hive and is processed by house bees, all corners of the hive are filled and the finite number of empty worker cells in the colony are occupied by developing bee brood (eggs, larvae and pupae), pollen or nectar/honey. The queen is primed to produce an abundance of new bees, but the colony is unable to satisfy her needs. As the flood of new worker bees are emerging, the queen is stimulated to lay an egg in one or more special cells called queen cups. Once the eggs in these special cups hatch, the bees feed the new queen larvae an all royal jelly diet from egg to emergence to ensure the development of a viable queen. Queen development takes 15 or 16 days, the fastest in the hive, and when she emerges will mate in a few days.

The Swarming Instinct

The swarming instinct develops when the bees are crowded and the queen is restricted in her ability to lay many more eggs. This is when the brood cells are full of new bees and storage cells are bursting with honey and pollen. Adding empty comb reduces swarming, while crowding increases the instinct. The queen produces less pheromone per bee, which stimulates the bees to slow the feeding of the queen at the same time she lays female eggs in the special structures called queen cups. The worker bees run the queen around the hive to give her some exercise and strengthen her wing muscles, which is necessary for her to fly with the bees in the swarm. When the new queen cells are sealed and there is a clear sunny day, about half the bees in the hive, along with the old queen, rapidly exit the colony and take flight. It is possible to walk through a swarm without being noticed by the bees, as they are focused on one thing—clustering on a location that provides them with a place to rest while their scouts find a location to build a new home.

A few days later in the parent colony, a new queen will emerge from her cell, search for any other queen cells, chew a hole into each of these cells and, sting her sisters, killing them. If two queens emerge at the same time, they will fight until one is dead. The new queen will then go through a one to two week transformation where she matures, mates, and her body swells with eggs produced in her large ovaries. During mating in the air, about 100 feet up, she will couple with 12 to 20 males and store seminal fluids from each drone in a special storage sac located near the tip of her abdomen. This sac, called the spermatheca, will protect and provide nutrition to the sperm for years.

In her new home, the old queen will be pressed by her swarm to produce a large number of eggs while the worker bees feverishly work to collect nectar. By converting this nectar to beeswax honey comb, the worker bees provide places where the queen can lay eggs, as well as storage chambers for honey. In the first 90 days a swarm builds nearly 90 percent of the honeycomb the colony will ever need. After a few months, perhaps in July or August, this older queen is replaced by a daughter queen in a process called supersedure. This new queen will be viable and strong enough to take the colony through the winter months. The break in the brood cycle will reduce the impact of the varroa parasite, increasing the colony's success at over wintering. In spite of this advantage, just one in six swarms will live to be a year old—there are so many challenges facing every hive, from diseases and pests, and starvation and queen failure.

While the swarm is constructing and filling comb in their new hive, the parent hive's new queen will repopulate the colony, returning it to its original strength. She will quickly reach an egg-laying rate of 1500 or so eggs per day and the colony should be strong enough to collect adequate stored honey to survive the winter. The average es-

In this photo provided to me by Rich Weiske, Royal Oak, MI., you see Rich with a swarm in a peach tree. Some trees are favorites for swarms, apparently due to chemical signals or use by prior swarms.

tablished hive lives for six years, replacing the queen through swarming and supersedure several times during this interval. While reports of longer-living colonies abound in beekeeping lore, these are exceptions, and may represent re-colonization by new swarms. Empty honeycomb left by a dead colony provides a huge savings in resource investment in resources to bee swarms. Beekeepers use swarm colonies to build new honeycomb and benefit from the honey foraging-storage instinct to collect a large honey crop.

Sometimes the old queen cannot fly with the swarm. In that case a daughter queen leaves with the first or primary swarm. All colonies may swarm more than once, and each subsequent swarm is smaller in size, making the parent colony too weak to make enough honey to survive the winter.

Honey Production

Colonies that do not swarm, and are otherwise healthy and strong, will build to 40 to 70 thousand bees at the peak of the season. It is hard to fight the swarming instinct as any colony with over 50,000 bees in a colony has a strong urge to swarm, especially prior to the main nectar flow. These large colonies produce more varroa mites because they produce more drones, where the mites reproduce fastest. This puts them at risk when the honey flow ends.

An extremely strong colony has the potential of producing 100, 200 or even 300 pounds of honey in a single season when climate and flower abundance cooperate. But such production is rare. National averages are 50 to 60 pounds of honey per colony per year. Both the high and average production may represent the same amount of effort by the beekeeper. The rewards of beekeeping are often random!

That said, to produce the maximum amount of honey from a strong hive, beekeepers follow a few principles:

One Big Colony Produces More Honey Than Two or Three Small Colonies.

When two smaller colonies have the combined number of worker bees as a large colony, they do not make as much honey. Instead, small colonies must shift worker bees away from foraging duties to colony defense, brood rearing, comb building and countless other chores. This reduces the number of bees that hit the air looking for nectar. Once colonies are established, beekeepers are smart to sort them into two groups each spring. One group will produce honey, and is managed so it does not swarm. The second group is used to produce increase colonies, a form of artificial swarming.

Colonies With Lots of Empty Comb Produce More Honey

One challenge every new beekeeper experiences is the lack of abundant drawn comb (when the bees have added wax to the foundation or produced natural comb). These empty combs have been shown to produce a chemical odor that stimulates the colony to produce more honey, stimulating honey hoarding behavior. This means that strong colonies should be given all the drawn frames of honey you can find as the nectar flow begins.

Timing Honey Super Addition

New colonies must fill most of the brood chamber with brood, stored food and bees. Once about 80-90% of the brood chambers, the lower box or boxes, are filled, the bees will move to honey supers when they are placed above. They are least likely to move to new foundation or starter strips over a queen excluder (used to keep the queen out of the area where you want the bees to store honey). Look for white or light colored wax at the top of the combs, and immediately add as many supers as you can (if they are drawn combs) or sequentially add frames of foundation. Seed the upper boxes with outside frames of honey from the box below (if they are the same size frames) that the bees are filling and put them in the upper box, above the queen excluder if you are using one, and gently 'tell' the bees what you want them to do.

Multiple Nectar Flows

In my home apiary, it is possible to get nectar flows from fruit trees (leaving the resulting honey for buildup), black locust, basswood, sweet clover, spotted knapweed and goldenrod/aster. Left to mix in the honey tank, this honey is sold as Michigan wildflower honey. Or the dedicated keeper can produce specialized varieties or artisanal honey by learning to selectively remove frames and supers of each nectar source. Done properly, we can remove each of these honey crops, extract the honey, and return the freshly extracted supers to the original hive. It is hard work, but varietal or artisanal honey is in great demand, especially from local food groups and home brewers. Do not ignore this market.

In my apiary the last nectar crop of the season is aster. I leave it on the hive so the bees can move the honey around for winter. After they have redistributed the honey to meet their needs, we evaluate each hive to see how much we may remove, if any. Keepers are advised to try to have all supers off the hive for winter, as this is a large area for the bees to monitor and a potential place for mice to nest. Store these combs so small hive beetles and wax moths are unable to destroy the comb. Freezing works well, keeping pests out and maintaining honey quality.

New book alert: *Bee-sentials: A Field Guide*. Due out in April, 2012. Check availability at www.wicwas.com.

Or contact Dr. C by email at ljconnor @aol.com

Use that site to check out April program in Denver and a May Queen Rearing Retreat in Virginia.