

Stahlman beekeeping notes for 2021

Issue # 48 Winter and Bees

According to the calendar winter 2021 begins on December 21 and ends on March 20, 2022.

Winter is the coldest season of the year in polar climates and temperate climates, between autumn and spring. Winter is caused by the axis of the Earth in that hemisphere being oriented away from the Sun. Different cultures define different dates as the start of winter, and some use a definition based on weather. When it is winter in the Northern Hemisphere it is summer in the Southern Hemisphere, and vice versa. In many regions, winter is associated with snow and freezing temperatures. The moment of winter solstice is when the sun's elevation with respect to the North Pole is at its most negative value. The earliest sunset and latest sunrise dates outside the polar regions differ from the date of the winter solstice, however, and these depend on latitude, due to the variation in the solar day throughout the year caused by the Earth's elliptical orbit.

As I watched football last Sunday, I saw snow – no not here in North Carolina but in some Northern states. We are seeing freezing temperatures North of Raleigh and people are covering plants but bees are still flying by noon. Weather is on my mind. What do we have to look forward to? Forecasters are predicting a year with some extreme weather patterns.

I am hoping that last year's weather doesn't repeat. Remember the snowstorm followed by extremely cold air that left millions in the dark across Texas. There seems to be a trend toward changing climate – summers warmer and winters colder. Our weather is influenced by events occurring when water near the equator of the Pacific Ocean is cooler. We hear terms such as La Niña or El Niño. Or another term Jet stream. We have a better idea of weather events than those W.W. II fliers of the "The Lady Be Good". If you have never heard of the tragic loss of "The Lady Be Good", it would be good winter reading.

Last year, a La Niña shaped the weather patterns across the United States. It is a phenomenon that occurs when the water near the equator of the Pacific Ocean is cooler than normal. This influences the jet stream coming down from the arctic to carry cold air south and east. An El Niño does just the opposite by carrying warmer air across North America.

Meteorologist are predicting a repeat of a La Niño again this coming winter. But they expect it to be weaker than the one experienced last year.

Did you know that the official start of the meteorological winter is December 1? On the calendar Winter doesn't start until December 21.

The bees realize that things change during winter regardless of what we humans think about it.

They see and feel the winter season is on us regardless of any calendar.

- Daylight hours are getting shorter. (less flying time)
- Temperatures are decreasing. No matter where a colony is located, the bees will begin to form a cluster when the temperature drops to the mid 50°F range. Some books indicate that bees start forming a cluster at 57°.
- Most foraging possibilities are not available. (Robbing becomes a major source of food from weak hives.)
- Bee populations are decreasing! By nature, the queen bee lays fewer eggs as food resources become unavailable and stops all together by the time winter arrives.

I had a friend from Ohio post a picture of snow falling in the Wooster, Ohio area on 11-14-21. No bees flying. Here in Raleigh, the mid-day temperature allowed some bees to fly and I assume they broke cluster from an overnight temperature in the low 30's but not freezing.

So how does a honey bee that flies from its hive react to the cold chill of the air? Its muscles freeze up and it drops to the ground to die. There is an interesting story told by A.I. Root about this subject in his autobiography. A.I. Root thought that by providing heat to hives in a building he constructed to protect the bees overwinter would result in better survival. Unfortunately, he learned that bees inside a heated building were tricked into thinking that they could leave the cluster due to the warmer environment. Thus, they tried to fly into the cold air outside. The result was dead bees – a lot of them.

I am going back to a Monday Note issue I wrote two years ago. I wrote the following:

What can you do during the winter season?

- Make sure your top covers are weighted down!
- Make sure you tilt your hives just a bit to allow water to run out of the hive entrance.
- Repair and refurbish equipment.
- Plan for next season:
 1. Read and study the latest information about bee management.
 2. Find a few good books to read – I would suggest 50 Years Among the Bees by C.C. Miller. It is still available and good reading with a lot of good information although last published in 1911 reprinted numerous times to the present day. My favorite all purpose book is called "The Beekeeper's Handbook" now in its fifth edition by Diana Sammataro and Alphonse Avitabile with a forward by Dewey Caron.
 3. Order bee equipment you will need for the coming season. I might also add consider ordering package bees if you are concerned with hive

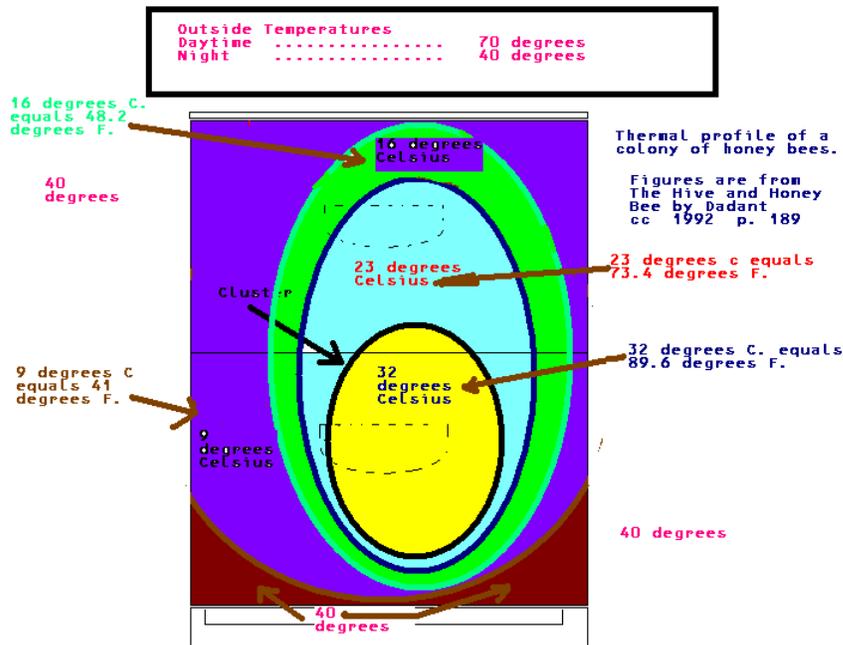
losses over winter. If a hive has died out this year, be sure to order replacement bees as soon as possible. Expect to pay more if you wait until spring to get them.

4. Visit your hive/hives from time to time. The purchase of a thermal Thermometer gun or Thermal camera may give a quick idea of the cluster size. On the other hand, a Broodminder temperature monitor may be the quickest and cheapest solution to knowing if your hive is alive. If the internal temperature of the hive is the same as the outside reading, the hive is dead!

Several facts regarding bees during winter:

- During the winter season, brood production stops except in warm climates. Brood should still be found in hives here in the triangle area at this time.
- Egg laying should begin by early January and at least by February in most regions of the U.S.
- A hive without brood will have a lower core temperature than a hive raising brood.

The first chart is from my Beekeeping 101, 201 and 301 Cd now out of print but sold from 2001 thru 2019.



This is an early fall thermal image of a hive in October.

The core temperature of the cluster varies with outside temperatures.

Note the temperature ranges with a temperature at 70 ° F and a 40

degree ° F reading. The cluster tend to move up as food is consumed above and around the cluster.

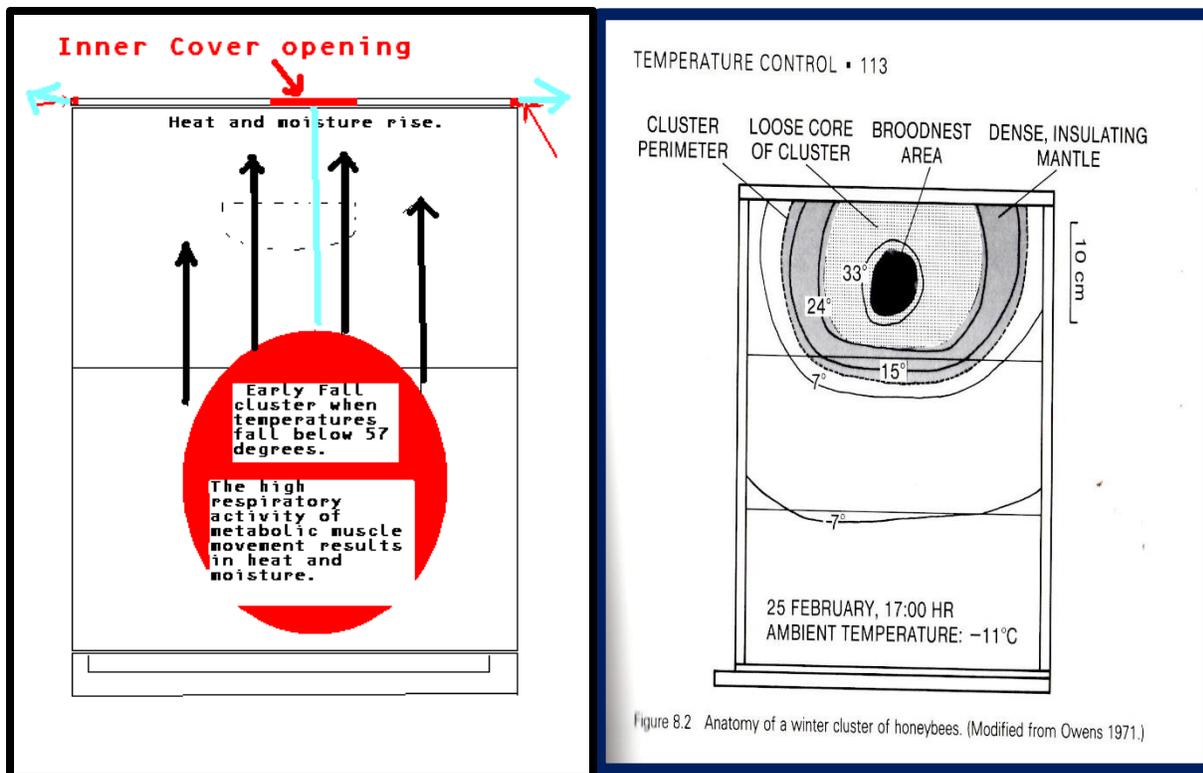


Illustration # 2

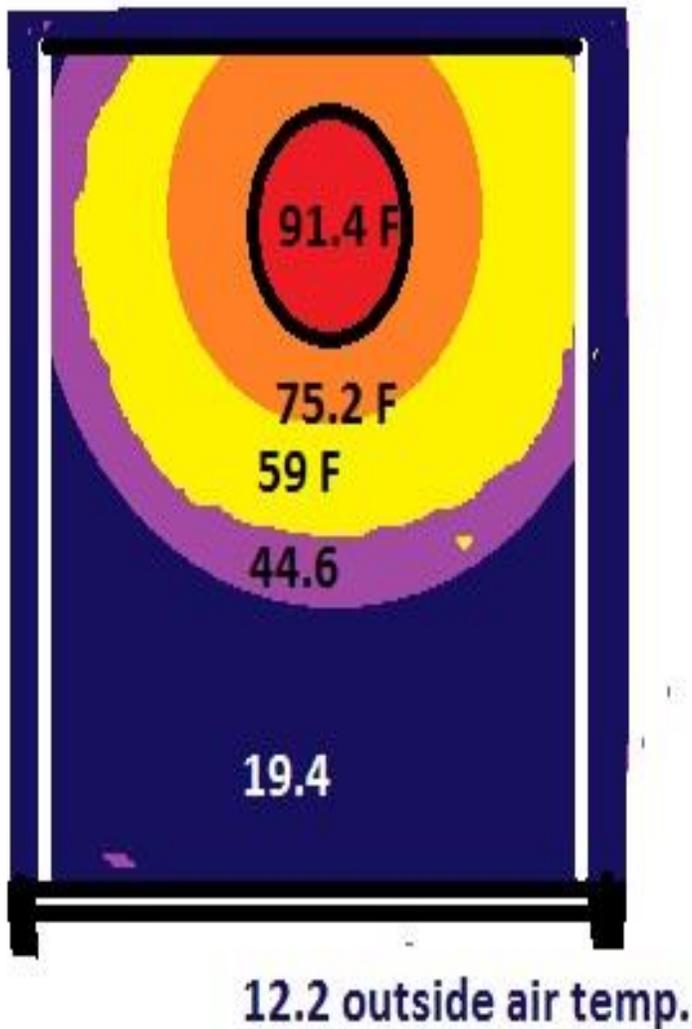
Illustration # 2 is found in Honeybee Ecology “A Study of Adaptation in Social life” by Thomas Seeley. It is a drawing published in 1971 from research by C.D. Owen’s Technical Bulletin 1429, United States Department of Agriculture.

By late winter the cluster moves up to the inner cover hole. Many studies have been made concerning the movement of the honey bee cluster during the winter season. Note the figure listed as #2. The ambient temperature is about the same as the outside air temperature. As temperature readings are taken closer to the cluster the temperature is tempered a bit by heat released by the cluster. I have converted the Celsius scale numbers to Fahrenheit numbers from the figure above to the illustration below. Note that the bees warm the cluster not the ambient air in the hive.

The winter cluster occupies the areas colored as red, orange, and yellow.

At 50 ° and below, bees become immobilized entering a sort of chill coma. Maybe you have revived a bee that fell in the snow while you visited a hive. It looked dead but when warmed, it came back to life. Bees can not survive long in the chill coma.

Honey bees use their flight muscles to shiver. This takes fuel. Without fuel – stored honey the bees are unable to generate heat to survive.



William Hesbach, author of an article in October, Bee Culture Magazine of 2016, describes clearly the way bees have adapted to the thermoregulation of the cluster to survive the winter season. If we use this illustration, we can see visually the three zones of the winter cluster. The red is the core of young bees. This area expands and contracts regulating heat for the brood. The heat in the core is distributed to the outside layers of bees in the cluster. Honey bees in the outer core areas position their hairs to interlace and serve as an insulator to retain the heat. Thus, the bees in the outer core area conserve energy and trap heat and moisture. When the cluster covers honey stores the bees can survive for some time during very cold weather. In Alaska, this may be survival at -50°F . I actually talked a beekeeper in Dawson City, Yukon Territory that shared with me that his bees survive the winter buried in the snow during their hard cold winters.

To recap what is needed for bee survival:

- A dry well sheltered dwelling.
- Honey stores within or close to the cluster.
- Warm air moves up and cold air descends causing a convective flow of air.
- Warm air holds more water moisture than cold air.
- Ventilation is necessary to remove moisture from the hive.
- Prevent drafts of cold air – Bees actually seal openings in a hive with propolis as winter approaches. Reducing the entrance to a hive actually helps bees conserve the ambient air temperature within the hive.
- A good healthy bee population and a healthy queen bee.