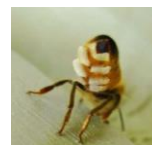


Stahlman beekeeping notes

for 2021



Issue # 47 Bees Wax

Beeswax, one of the products of the bee hive, is often overlooked for the value it offers as additional income from the hive. Large commercial honey producers sell vast quantities to industries using beeswax in many ways. Many hobby beekeepers use the wax for making candles, soap, various facial creams, and lip balm. Many honey shows include a bee wax category. Beeswax has commercial value. Retail white and cleaned beeswax prices reported are \$16.00 to \$20.00 per pound mostly \$18.00. Yellow is around \$10.00 and dark wax \$2.50

What is beeswax:

- It is natural wax formed into scales by eight wax glands in the abdominal segments of the worker bee.
- It is used by honey bees to build cells for larval development and a protective cap for honey storage.
- It consists mainly of esters of fatty acids.
- New wax is colorless and become yellow when contaminate with pollen and propolis.
- About 1100 are needed to make a gram of wax.
- It is estimated that the bees need to collect about 10 pounds of honey to produce one pound of wax.
- To make wax the ambient temperature of the bee nest must be in the range of 90°F +.
- The physical Characteristics of bees wax are:
- The color of beeswax varies from nearly white to dark brown.
- One chemical equation--for beeswax is $C_{15}H_{31}COOC_{30}H_{61}$ The chart is from the Wikipedia web site.
- Beeswax is the beekeeping matrix with the highest pesticide content. *Published report by Elsevier B.V
(<http://creativecommons.org/license/by/4.0/>)

Most processed wax comes from cappings when honey is removed from comb in the extracting operation of the beekeeper. Old dark comb in frames is rendered by melting comb to separate the beeswax from the pupa casing, and silk of the old comb.

After processing wax from comb, the resulting impurities [silk-cocoons, bee dropping, propolis and bee parts] form a dark almost black substance called Slumgum. Thus, cappings

Wax content type	Percentage
Hydrocarbons	14%
Monoesters	35%
Diesters	14%
Triesters	3%
Hydroxy monoesters	4%
Hydroxy polyesters	8%
Acid esters	1%
Acid polyesters	2%
Free fatty acids	12%
Free fatty alcohols	1%
Unidentified	6%

cut from comb so honey can be extracted is free of many of the impurities and is light in color.



Beeswax has a low melting point depending on elevation above sea level. The general range is (144 to 148°F). One needs to be very careful heating wax. The flash point of beeswax is about 400° F. Many beekeepers have had serious fires including The Walter T. Kelley wax processing plant destroyed by fire in 1995.

Wax being melted down should never be left unattended. If it starts to burn, don't try to put the fire out with water! A fire-extinguisher should always be available. A small amount of water placed in the sauce pan shown allows the wax to float above the water and is much safer than just putting pure beeswax in the pan to be melted. There is always danger of a boil over – so find someplace other than the kitchen to work with beeswax. An open outdoor location would be ideal.

One other important point, **beeswax foundation is very brittle when cold. Some bee suppliers will not ship beeswax foundation during freezing temperatures.**

It is also hard to work with in hot temperatures. An ideal working temperature is 85 to 94°F. That also happens to be the working temperature within a hive of bees. Brood temperatures are usually reported at 92°F.

Beeswax has a smell! Most consider the smell as fragrant. The smell depends upon a number of things but overheating bees wax causes it to darken and produce a burnt smell.

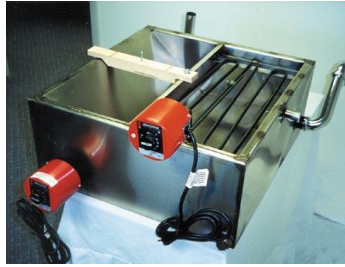


Most of the wax that hobby beekeeper produce is done at home using a hot knife to remove the wax cappings from the honey cells.

A small commercial beekeeping operation may have a wax spinner which separates honey from the cappings. The honey along with the cappings are pumped into the spinner which separates the wax and honey. This is a spinner showing how the wax drops into a pan under the spinner. The wax is not exactly dry but is then placed into a wax melter



There is no fuss with processing the cappings which in most extraction operations is a bottle neck.



Another way to get wax from cappings is a wax melting tank. It operates on the principle that beeswax floats above honey. Wax cappings fall into the melter, rise above the honey to the

electric heating elements. The heating elements melt the wax and presto! The melted wax flows into a container to cool and harden.

Or if you are like me now retired without the bee equipment available – I have a solar wax melter to do the job. Some beekeepers will filter the honey by placing the cappings over a wire screen until almost all the honey is drained. The cappings are still quite wet and often are taken to the bees to recycle all the honey left. I have also seen beekeeper place the cappings in a bucket of water – feed the water and honey mix back to the bees in top feeders.

The cappings are then air dried and melted. There are so many ways beekeepers have found to separate the wax from honey. How about pouring the cappings into a silk stocking tied above a bucket? It works for a small batch of cappings quite well.



How is beeswax used?

Beeswax is favored by those making candles. Beeswax burns clean with little smoke. It also has the advantage of burning brighter and

longer than other waxes.

A few comments regarding processing beeswax!

If water is used to melt the wax, one will find the wax melts and floats above water. Once the wax has melted, and allowed to cool, the wax will begin to return to a solid state. On the underside of chunk of solid beeswax will be found a layer of slumgum. Slumgum has some wax retained in the cocoon silk and debris. For the average beekeeper it really doesn't pay to process the slumgum. To do so would require a hot water or steam press.

Containers used to process beeswax should not contain iron. Stainless steel is best.

Wax can be bleached to a lighter color! One of the most cost effective ways is to expose the wax to the sun's rays. An ideal solar wax melter will more than pay for itself. Glass lined tanks filled with bees wax and exposed to Oxalic acid have been used in the past. Acid will corrode steel and other metals. Thus, using acid is not highly recommended to anyone not able to meet certain safety standards. I also might note that the cost to make the wax lighter will never come close to paying for the effort.

What is bloom on beeswax?

When beeswax sits around for some time it will develop a bloom – a substance that looks like mold. The bloom can be rubbed off and the wax will resume its natural appearance. Nothing is wrong with the beeswax!

I found a source that lists 125 ways beeswax is used. I am not going to list them all but the most common use is in cosmetics. We all know of its use as foundation put into frames. How about queen cell cups – most queen breeders are now using plastic.

For the hobby beekeeper wanting to make a few products from wax they have on hand, there are formulas for making shoe polish, furniture polish, surfboard wax, and waterproofing solutions. And of course, wax candles! If you do any grafting of plant material – you can make your own grafting wax. If you do carpentry work, you can use a bit of wax to make nails pound easier into wood. How about using it to protect cheese!

So much beeswax is lost. Saving small pieces of burr-comb, brace comb, and even scraping top bars of comb can add up in time.



This is a good example of comb that could be recovered. The space between the frames in this hive allowed the bees to build comb because the Langstroth bee space is violated. One might also see something like this when installing package bees. The three hole wooden queen cage

requires extra space for the queen cage to fit between frames. Bees usually will build comb down and around the cage. I would suggest the beekeeper have a small bucket to carry with them to the bee yard to put pieces of wax.

When melting wax for display, the wax needs to be cooled slowly to avoid cracks. Melt the wax slowly if pouring into a mold. The mold can then be placed into a warm water bath to slow down rapid cooling.

Some of the history of beeswax.

Some people talk about the use of honey 2000 years old. Honey does age well but beeswax retains its characteristics indefinitely. Candles (intact) have been found in graves dating to the early centuries AD. Unlike honey, beeswax is not hygroscopic (absorbs water). Beeswax never goes bad unless exposed to oils and fatty acids which absorb and softens bees wax. [one reason it is used in cosmetics (lotions)]

According to Wikipedia, beeswax has been used since prehistory as a plastic, a lubricant and waterproofing agent. It was used in the lost wax casting technique, encaustic painting, and an agent to treat leather and wood. It was an ancient form of dental tooth filling. It has been found in the tombs of Egypt, in wrecked Viking ships, and in Roman ruins.

A solar wax melter is not going to be of much help now that cold weather has slipped in to Raleigh. However, I have a propane turkey cooker that is ideal for working with bees wax. I melt a number of smaller chunks of wax into a more uniform light color by filtering it several times before I am satisfied I have lightened it as much as I can.

If one has molds for bees wax, now is a good time to pour wax into the molds. I am getting ready to clean some old plastic foundation and the winter season does give me a good time to work on that project. In fact, I will cover the topic before the year is out.