



Mid-Atlantic
Apicultural Research &
Extension Consortium

Delaware, Maryland, New Jersey,
Pennsylvania, West Virginia
and the USDA cooperating

Beeswax

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Beeswax is a natural product produced by worker honey bees from special glands located on the underside of their abdomen. Liquid wax is secreted and cools on the abdominal sclerites making wax scales. These scales are molded by the worker's mouthparts into a complex hexagonal pattern called comb. Comb is pure beeswax cells that are six-sided facing opposite directions from the midrib. When produced by worker honey bees, beeswax is white but it quickly darkens from contamination with pollen and contact with the bees in the hive. Beeswax taken from the bees and melted by the beekeeper generally is lemon yellow in color.



Beeswax has a fairly high melting point between 143-145° F. It is very stable and subject to deterioration by very few solvents. The sun will bleach beeswax but few other materials affect it. It has been brought out from shipwrecks after decades under saltwater in good condition. Beeswax burns very slowly and naturally and has a very fragrant aroma. These two qualities make beeswax candles truly unique and superior. However, the largest commercial use of beeswax is in the cosmetic industry.

Obtaining beeswax

Beeswax is produced only by honey bees and is a by-product honey bees and is a by-product of extracted honey production. Generally, for every 100 pounds of honey one to two pounds of wax will be produced. The harvestable beeswax usually comes from the cappings of the honey filled

cells. The beekeeper removes these wax cappings before extracting the honey from the beeswax comb. Occasionally beekeepers melt down old comb producing beeswax that is dark in color.

Those interested in making beeswax candles or other beeswax products can obtain the wax from beekeepers, from companies that make candles, or from hobby shops. Generally, the beekeeper is the best source of wax. Light wax is preferred in candle making but is not always available. The most common reasons wax darkens are contamination with propolis, which bees use in their hives for protection and insulation, and from contact with containers of iron, aluminum, copper and some other metals. It is fairly difficult to try and lighten wax that has been contaminated or has been darkened through contact with certain metals.

Preparing beeswax for use

Beeswax needs to be cleaned before use. Since beeswax has a low density, it floats readily in water. Virtually all the impurities in beeswax, particularly honey, are heavier. The easiest way to remove dirt and other materials from beeswax is to melt it in a tub of hot water. The beeswax can be ladled from the top once it is cooled and placed in plastic or stainless-steel pans. **CAUTION-beeswax is flammable.** If beeswax should boil over or flow onto the burner there is danger of a violent fire. When handling beeswax, low heat and careful attention are advisable. Paper milk cartons or plastic milk or juice containers make good wax containers. If impurities are found on the bottom of the chunks, the cleaning process can be repeated.

Molded candles

Beeswax candles have been used for hundreds of years. They are slow burning and have a pleasant natural aroma. With the proper wick they are smokeless and dripless. Candles that are at least 51% beeswax are still used in some churches, particularly the Roman Catholic Church. The wax serves as a symbol of purity and the Virgin Mary because of its origin from the worker bee. In addition, the volatilized beeswax coated and helped protect the church's paintings.



Beeswax can be molded in any number of interesting shapes. Beeswax contracts considerably when solidifying from the liquid state and this must be compensated for when using a mold. The larger the size of the mold, the greater the shrinkage. The value and the uniqueness of beeswax

lies in the beeswax itself rather than in the form of the candle. Likewise, there seems to be little value gained from adding colors, aromas or other substances. Ordinary candle molds as well as unusual ones can be purchased from hobby shops and from bee supply companies. Prior to starting, wick suitable for the diameter of the candle should be in place. Most candle molds come supplied with directions on how to install wicking. At the top of the mold you need a little excess wicking for initial lighting of your candle when it is completed. Traditional taper molds usually provide this feature since the candles are made in pairs and one piece of wicking runs down one candle through the top and back into the mold and down through the second candle. Once the wicking is in place and centered it should be pulled taut. Any excess holes at the top of the mold can be covered with wax or clay or alternatively the candle mold can be placed on a piece of sponge dipped in cold water before pouring the wax. Always work on a surface you can clean in case the wax is spilled or it leaks from the mold around the holes for wicking.

Only the finest beeswax should be used in candle making. Prepare by putting chunks of beeswax in a stainless-steel or properly tinned container; this can be placed in softly boiling water. After it is completely melted, let it settle and cool slightly before pouring. Pour the beeswax in an even, steady manner. Beeswax has the tendency to stick to metal molds and all metal molds should be properly greased with silicon spray or vegetable oil before use. Silicon molds do not need to be sprayed and once wicked you can just pour the melted wax right in. Since beeswax contracts you will need add further wax at the bottom of the mold, about 2 to 5 minutes after the initial pouring. Remove excess wax from the bottom of molds (most have a rim to hold a reservoir of excess wax) soon after it is hardened. This is a simple operation if done while the wax is still warm and soft.

The candles can be removed from the mold after they are completely hardened, usually the next day. With molds that do not come apart, the wicking needs to be cut before the candle can be pulled from the mold. If the thin layer of silicon does its job, the candles should come out the molds fairly easily. Sometimes putting the mold in the freezer for a few minutes before pulling out the candle or running warm (not hot) water over the mold before pulling out the candle helps. If beeswax does get stuck to a mold, the mold must be thoroughly cleaned before reuse. Lye solution is about the only common solvent that will loosen beeswax. However, lye is extremely caustic and dangerous and caution is advised when using it to clean a mold.

Dipped candles

Dipped candles are very distinctive and very appealing. They are made straight by initially starting with the wick drawn taut in a frame. You will want to construct a frame that will be suitable for the size of the wax reservoir you will be using. By all means try to use a large container and make a number of dipped candles at one time. Frames that seem most convenient are those that you can use to dip the first 5 to 10 times and then dismantle before continuing to the final size.

The dipping procedure is not complicated. On the first dip you should leave the wicking in a minute so the wax soaks into it. Following this, the candles are dipped, on their frame, into the wax and then withdrawn in one motion. The wax should be at a temperature that maintains the liquid state but should not be excessively hot. A hook on the frame is useful because you will

want to hang the wet candles for a period of 3-5 minutes between dips to solidify. After 5 to 7 dips, the wax candles will be roughly the diameter of a pencil and can be removed from the frame to dip individually. Alternatively, if you construct a frame that holds several candles, you can dip several candles together using the top of the dismantled frame. Continue the dipping process until the candles are roughly $\frac{3}{4}$ to $\frac{7}{8}$ inches wide. Prior to the last dip the extra wax that has accumulated at the bottom should be clipped off at the bottom of the wick. This will sometimes be as much as one inch long. The single drip at the end of the last dip should be retained marking the fact that it is a hand dipped candle. You can add a distinctive label prior to the last dip. The label will be visible under one or two layers of wax.



The most efficient dipping involves a large number of candles. To ensure enough wax, have a second pot to melt extra beeswax to replenish your dipping pot as you go along. If you have some wax that is dark you could use it for the first few dips, switching to the high-quality beeswax for the last three to five dips. Dipped candles should be allowed to cool after dipping has been completed. Completed candles will be about 5 ounces in weight.

Rolled candles

Another type of candle that may be made from beeswax is a foundation candle. Beekeepers use foundation to start their beeswax comb. Foundation sheets measure $8\frac{1}{2}$ by $16\frac{3}{4}$ and have impressions of six-sided cells of bee comb. By cutting and rolling these foundation sheets you may obtain some very attractive and unusual looking candles. Special books are available from hobby shops or bee supply dealers illustrating some of the number of possibilities for foundation candles. These same firms sell the foundation sheets in a large variety of colors. You can use a single color or have a distinctive candle by combining two or more colors as you roll the candle.

Whether they are molded, dipped, or rolled, beeswax candles are attractive. They are very slow burning and have a pleasant aroma. Unusual shapes or additions do not necessarily enhance beeswax candles. Their uniqueness comes from the material, beeswax, rather than from size, shape or color.

Beeswax for shows

Beekeepers prepare blocks of beeswax for exhibition at honey shows and fairs. It is important to have wax that is of a proper color and odor for exhibition. Lemon yellow is the preferred natural color. You must be sure to avoid discoloration by impurities in the wax or by reaction with metals when preparing wax for shows. Be careful of odor contamination too. Another problem to consider in preparing show entries is cracking. Smaller sized beeswax chunks have less tendency

to crack than larger ones. Cracking is a problem because beeswax contracts when it solidifies. The best way to prevent cracking is to let the wax cool slowly in a warm room. Heavily greased molds or mold sides well coated with soapy water helps prevent cracking because as the wax solidifies it cannot stick to the side of the mold and produce an imperfection. Letting the wax harden very slowly by insulation sometimes is of benefit, especially with large chunks. By heating the environment in which the wax is solidifying there is more uniform solidification. Avoid having the surface harden quickly while the interior remains liquid. Use dry heat such as an oven or a 160° F water bath. You might even wish to add water to the top side after the surface solidifies.

Show entries should have square corners and even sides. This is difficult because of the shrinkage of beeswax while cooling. The larger the volume of wax the more pronounced the effect. One way of making sharp and distinct edges and corners is to put aluminum foil over the bottom and sides of an electric frying pan or regular frying pan on very low heat, to gently melt the edges of the beeswax chunk. Melt sides and corners slowly and uniformly until they are flat and square. From time to time pour off the melted wax. With patience you can secure a uniform block of wax with this technique. The last consideration when submitting beeswax for entry in shows or fairs is that beeswax be clean. There should be absolutely no dirt.

Beeswax cosmetics

Beeswax is useful and beneficial in several types of cosmetics. When beeswax is combined with a mineral oil or olive oil and made into a paste or salve, the resulting mixture is soothing and protective to the skin. It provides a soft, flexible coating that resists water, but which can be removed with soap. When beeswax became scarce during World War II, lanolin (from wool) and paraffin were developed for cosmetics and because they are cheaper today, they have replaced beeswax in many modern commercial cosmetic preparations. Neither are as stable or beneficial for the skin.

Beeswax uses

Beeswax is used in a number of industries such as automotive, textile, and shoe manufacturing. It produces a soft but highly glossy wax for furniture and floors. Some specific uses are as follows:

Thread- Waxing thread or needles with a small amount of beeswax will make sewing easier and faster.

Waxing nails- Beeswax on a nail reduces the force required to drive nails, reduces the percentage that bend and reduces wood splitting. Waxed nails have somewhat less holding power initially but this disappears with time. Place the point of the nail on a piece of beeswax before use.

Wax molding- Beeswax molds well around 100° F and a little additional heating results in a soft, very pliable wax for all types of modeling. It is extensively used in molds such as dentist uses.

Preservation- Waxing rusty tools, saws, drills etc. will make them last longer, halt the rust and make them easier to use.

Wax polishes- Beeswax polishes can be used on wood, leather, furniture and floors. A beeswax-turpentine mix is great on wood, tile, or linoleum. Mix any proportion of beeswax in turpentine,

or for a standard wax mix 1 pound beeswax, 1 pint spirits of turpentine and 1 pint boiled linseed oil. Add the turpentine and oil to the melted wax. Use warm by applying a thin coat with a soft lintless cloth, let dry and then buff briskly with a wool cloth. On new wood, melting the wax mixture will ensure better absorption into the pores of the wood. Beeswax-based waxes polish very nicely by buffing with a soft cloth. Repeated applications may lead to a gummy waxy mass. Old coats can be removed by rubbing or with an organic solvent.

For faster drying, harder wax add naphtha (caution: it is flammable) or carbon tetrachloride. A non-waterproof wax can be made by boiling beeswax in a solution of potassium or sodium carbonate or hydroxide to saponify and then adding water (to the soap produced). This latter wax works well on surfaces that are already finished.

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University of Maryland
College Park, Maryland

Rutgers University
New Brunswick, New Jersey

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University Park, Pennsylvania

West Virginia University
Morgantown, West Virginia

Requests for information or publications should be sent to: MAAREC, 531 S. College Avenue, Townsend Hall Rm 250, Newark, DE 19716 Phone: (302)-831-8883 Web site: <https://agdev.anr.udel.edu/maarec>. This publication is available in alternative media on request. The mention of trade names or commercial products in this publication is for illustrative purposes only and does not constitute endorsement or recommendation by the Mid-Atlantic Apiculture Research and Extension Consortium or their employees. The U.S. Cooperative Extension Service and the U.S. Department of Agriculture provide Equal Opportunities in employment and programs.

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MAAREC Publication 3.9 Authors: Dewey M. Caron, Deborah A. Delaney, Daniel Borkoski and Cindy Bee