

Central Bee Research Institute
Directorate of Beekeeping
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BEE SWAX

Beeswax is used by the bees to construct their combs in which they store honey, pollen and rear brood. The beeswax is secreted in the form of wax scales by the worker bees in their wax glands located on the underside of the abdomen in the anterior part of the sternum of segment IV to VII. It is estimated that about 10 to 15 parts of honey are consumed by the bees to secrete 1 part of wax.

Sources

In India, beeswax is generally collected from four species of *Apis* : ***Apis cerana Indica***, ***A. mellifera***, ***A. dorsata*** and ***A. florea***. ***Trigona*** sp., the stingless bees, also build small wax combs in walls and other crevices but they use large quantity of propolis to fill up the cracks and holes to narrow the entrances. This variety of honey bees is not very important from the point of view of wax production. In India, therefore, commercial samples of beeswax usually represent a composite mixture of waxes derived from these ***Apis*** species. However, wax marketed in most of the other Western and European countries is derived from a single species of honey bee i.e. ***A. mellifera***.

Constituents

The old damaged or diseased combs are the sole sources of natural bees wax which are melted to the pure cake form. The physico-chemical constituents of the Indian beeswax slightly differ from those of European beeswaxes. The wax secreted by ***A. cerana Indica*** however conforms to British and Pharmacopoeia standards except for its low acid value. The other two Indian waxes have lower acid values and lower melting points thus do not match these standards. It is therefore necessary to extract the waxes from different Indian species separately instead of mixing them together.

Uses Of Beeswax

The beeswax has numerous uses in beekeeping as well as in other industries. It is chiefly used to manufacture the comb foundation sheets on which bees construct their combs.

In India, rock bees **A.dorsata** are the main source of wax production. This wax is of poor-quality owing to impurities such as larval juices, dirt etc., because of unhygienic extraction methods. It was thus, not used in manufacturing the comb foundation sheets. But recent experimentation involving hygienic extraction methods showed its acceptance by the hive bees as comb foundation material.

The cosmetic and the pharmaceutical industries are the other large users of beeswax. Beeswax is also used in waterproofing, shoes and floor polishes, wax models, candles, carbon papers, inks, adhesive tapes, insulating tapes, etc. Large quantities of beeswax are also used in ammunition factories.

Methods of beeswax Extraction

India produces large quantity of beeswax and most of which is exported. In order to increase our production and its quality for export, we have to improve methods of collection, extraction and purification etc. The old, damaged and diseased honey combs are collected and then extracted using one of the following methods.

1. Extraction Over Boiling Water

- a) **Old wax combs** : The old wax combs are soaked in water for several hours and washed intermittently so as to remove water soluble material from the combs. If this step is not employed, the melted wax will absorb some impurities and coloration also. After this, combs are melted over boiling water. the melted wax floats on the surface and is strained along with boiling water through wet cloth to remove bees and other foreign material present in combs. After cooling, the wax cake is formed at the top of water. The dirt layer at the bottom of cake is removed by scraping.

The water used in the melting process should not contain minerals. Soft water, preferably rain water, should be used. Stainless steel or aluminum or nickel vessels are desirable. Since

wax-acids react with zinc resulting into dull coloration of the wax, zinc or galvanized iron or iron vessels should not be used.

- b) **Extraction in hot water wax press :** After the wax is extracted by the above method some quantity of wax remains in the scales or cocoons of the bees that remain after filtration also. This is especially observed with old combs. To extract maximum quantity of wax out of these scales, wax press is employed. The wax scales or the old combs are put in a cloth bag which is kept in between the two metal plates of the press. The press is kept in boiling water and the wax bag is pressed between the two plates operated by a screw. The melted wax comes out through the bag and floats on the water. The wax press is very successful when large number of old combs are to be handled. the wax extracted by this method is in most of the cases, darker in color.

2. **Steam wax Extractor**

In this process the wax is melted in an insulated tank by steam blown directly into the mass of wax combs or by contact with steam heated coils. The melted wax drops down and settles in the pan located at the base of the extractor. The extraction of wax by this method, however, requires several hours depending upon the quantity of wax, age of combs, efficiency of insulation, etc.

3. **Solar Wax Extractor**

This is one of the best methods of wax extraction as the wax is bleached to some extent as a thin film of melted wax flows slowly into the receiving pan. Moreover, there is no likelihood of any contamination with chemicals or spoilage of color due to excessive heating. Its disadvantage however lies in the length of time required to melt the wax.

Solar wax extractor has immense potential in our conditions but has not been exploited by the people. This method is very efficient for melting burr and bridge combs, capping, damaged new combs, etc. The combs are washed with water as described earlier and are placed in solar wax extractor (Fig.1) covered with double glass plates. The extractor is arranged in an inclined position facing the sun. The melted wax slowly flows and accumulates in the receptacle, half filled with water.

The wax cakes thus prepared are packed and stored in cool temperature for future use.

Detailed information about these methods of wax processing, bleaching, etc. are given in our Technical Bulletin number 25.

KVIC / CBRTI