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Production and Trade of Beeswax

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Abstract

Beeswax is a valuable product that can provide a worthwhile income in addition to honey. One kilogram of beeswax is worth more than one kilogram of honey. Unlike honey, beeswax is not a food product and is simpler to deal with - it does not require careful packaging which simplifies storage and transport. Beeswax as an income generating resource is neglected in some areas of the tropics. Some countries of Africa where fixed comb beekeeping are still the norm, for example, Ethiopia and Angola, have significant export of beeswax, while in others the trade is neglected and beeswax is thrown away. Worldwide, many honey hunters and beekeepers do not know that beeswax can be sold or used for locally made, high-value products. Knowledge about the value of beeswax and how to process it is often lacking.

What is Beeswax

Beeswax is the creamy coloured substance used by bees to build the comb that forms the structure of their nest. Very pure beeswax is white, but the presence of pollen and other substances cause it to become yellow. Beeswax is produced by all species of honeybees. Wax produced by the Asian species of honeybees is known as Ghedda wax. It differs in chemical and physical properties from the wax of Apis mellifera, and is less acidic. The waxes produced by bumblebees are very different from wax produced by honeybees. Pure waxes from different species of stingless bees are also very different from the other types of beeswax. It is much darker in colour – dark brown, and when it is warmed, it stretches without breaking. It is also sticky and much more difficult to break than beeswax from Apis mellifera.

Beeswax Production

Worker honey bees produce beeswax from wax glands on their abdomens. They secrete liquid wax which hardens into small flakes upon contact with air. A worker bee produces eight of these wax scales every 12 hours. The size of the wax glands depends on the bee's age, being largest around 12 days old and declining afterward. About one million wax scales are needed to make one kilogram of wax. Bees use their hind legs to remove the wax scales, passing them to their mandibles where they mix them with saliva to form new wax. This wax is used for comb construction or sealing honey cells. Bees are prompted to produce wax when there's extra honey to store and insufficient comb available. When bees swarm to establish a new nest, they first build beeswax combs. This process requires a high temperature, which is achieved by the bees clustering together. They form chains called "garlands" or "festoons" where they secrete wax. Bees then chew and mix the wax with secretions before using it to

build combs. During construction, bees vibrate the comb with their jaws to gauge its thickness, adding or removing wax as needed.

Comb

The comb is the bees' home structure, used for storing honey, pollen, eggs, and raising young bees. Its hexagonal shape is formed by workers using their antennae during construction. This shape optimises material strength and usage, with no wax wasted. The tightly packed cells ensure maximum strength.

Beekeeping for Beeswax Production

In frame hive beekeeping, like with Langstroth or Newton hives, empty combs are recycled back into the hive after honey extraction. This maximises honey production and minimises wax production. The honey to beeswax ratio is about 75:1, meaning more honey is harvested compared to wax. However, in traditional fixed-comb or movable-comb hives, like top-bar hives, honey extraction involves breaking delicate honeycomb, preventing its return to the hive. This results in a higher beeswax yield, with a ratio of about 10:1 for honey to beeswax production. Countries in Africa, where traditional beekeeping methods are common, produce significant amounts of beeswax, often as a valuable export. Bees produce wax mainly during times of good honey-flow when they need comb to store nectar. During scarcity, wax production stops, and bees recycle existing wax for sealing cells. Wax-producing bees require plenty of food, with about eight kilograms of honey needed to produce one kilogram of beeswax. During swarming, all worker bees, regardless of age, participate in wax production, with younger bees starting sooner and older bees
resuming production.

International Trade

It is not easy to obtain official statistics concerning beeswax production: for example, there are no official figures for beeswax production in EU countries. The EU imports around 6,000 tonnes of beeswax per annum, approximately 50 percent of this coming from developing countries. The main importing countries are Germany, France and the UK. These nations all have significant pharmaceutical and medical industries requiring beeswax. Tropical countries dominate world beeswax production and export, with industrialised countries needing to import beeswax.This Because,as described above, in local styles of beekeeping both honey and wax are harvested.

Beeswax Composition and Properties

Beeswax is a very stable substance, and its properties change little over time. It is resistant to hydrolysis and natural oxidation and is insoluble in water. It is complex material consisting of many different substances, but predominantly esters of higher fatty acids and alcohols, pigments mostly from pollen and propolis, as well as minute traces of bee material. It is solid at room temperature, becomes brittle once the temperature drops below 18 °C and quickly becomes soft and pliable at around 35 to 40 °C, with a melting point of 64.5 °C.

Uses of Beeswax

Beeswax has hundreds of uses, of which the following are but a few examples.

In cosmetics: Around 40 percent of the world trade in beeswax is used for the cosmetics industry, which requires first class beeswax that has not been overheated, is pure and free from propolis. The world price is Bees and their role in forest livelihoods 106 usually around US$4-10 per kilogram. At a local level, making skin ointment from beeswax can be one of the most profitable beekeeping activities.

In pharmaceutical preparations: Around 30 percent of world trade in beeswax is used by the pharmaceutical industry that, like the cosmetic industry, requires good quality wax.

Candle making: Around 20 percent of the beeswax trade is used for candle making. Beeswax candles are less common and more expensive than candles made from paraffin wax. In the paschurch candles had to be made of 100 percent beeswax, and this is still followed in some societies.

Other uses: Around 20 percent of the world trade in beeswax is used for:

- Models and casting in industry and art. Wax is used for to make figures for decoration or sculptures and jewellery before they are placed in a mould for casting in silver, gold or bronze. This method is called lost-wax casting or cire perdue.
- To make polish for cars, furniture, shoes and for treatment of other leather products. In grafting waxes.
- In lubricants for industrial use.
- Electronics used as insulation in electronic components in the computer industry, and in the manufacture of CDs.
- In poor societies, beeswax is used as a sealant, for example to make air and water- proof sealing of bottles and containers, to repair of broken calabashes, for grafting on branches, etc. In batik dyeing of fabrics.
- In making drawing crayons. It is used for confectionery coatings. It is used to strengthen threads used in darning and sewing.

General Rules when Working with Beeswax

- Work in a well-ventilated area to avoid inhaling fumes.
- Use low heat to melt beeswax to prevent overheating and degradation.
- Avoid direct contact with flame to prevent combustion.
- Keep surfaces clean to prevent contamination.
- Use stainless steel or heat-resistant utensils for melting wax.
- store beeswax in a cool, dry place away from direct sunlight.
- Test wax for purity before use, ensuring it's free from contaminants.
- Dispose of waste wax responsibly, avoiding environmental contamination.
- Follow safety guidelines when handling hot wax to prevent burns or accidents.

Harvesting Wax from Very Old, Black Combs

Even very old, black scraps of comb can be of some value to obtain beeswax. However, beeswax cannot be obtained from them using a solar wax extractor. This is because such combs contain large numbers of cocoons and pupa cases discarded by successive generations of developing honeybees, and these soak up the wax as it is melted. Wax from such combs can be obtained by breaking them up, and soaking them in water for 24 hours, then tying the combs in a piece of sacking and boiling this in a container full of water. Some wax will float to the surface, but the bag of wax must be agitated to obtain the maximum harvest. If left to cool overnight, a round cake of solid
beeswax will form on the surface of the water.

Extraction with Boiling Water and a Wax Press

Pieces of comb are placed in a large container (around 100 litres), about one third full of boiling water and allowed to melt. When all the wax has melted pour the contents of the containers into a jute-lined wax-press. When pressure is applied, the wax runs out. After the first pressing, the content can be stirred and then pressed again, and this process repeated until all the wax is extracted. Once again, the water and molten wax run into a container, where, as the mixture cools, the wax rises to surface because of its lower density than water.

Slum Gum

Slum gum is the black residue remaining after the wax rendering process. It is composed of cocoons from the bees' brood cells, wax moth cocoons, excrements from larvae and some

leftover wax. If the slum gum still contains a lot of wax, it will form a solid cake when cool. If it is low in wax, it crumbles when dry. Most often slum gum is discarded. It burns well and can be used for firewood in cooking, and to make firelighters. In daytime, it can attract many bees if too much wax is left in it, so if it is used for fires in the open, it is better to use it after dark.

Marketing Beeswax

In North West Zambia, beekeepers are harvesting honey and beeswax from bark hives, with both commodities serving as a cash crop for export to Europe. In this system, farmers harvest the honey and the wax at the same time. When groups of beekeepers combine their beeswax harvests, they can accumulate enough quantity to sell. Beeswax for export should be clean and heated as little as possible. Little processing is required: it can be moulded into blocks, the broken into smaller pieces, which can then be placed in hessian sacks for export. The wax is broken into smaller pieces to prove its purity and to show that no bricks are concealed in the centre of the lump!

Beeswax Wrap

Beeswax wraps are a sustainable alternative to plastic wrap for food storage. They're made by infusing cotton fabric with a mixture of beeswax, pine resin, and jojoba oil. This creates a flexible and slightly sticky wrap that can be moulded around food or containers, forming a seal to keep food fresh. Beeswax wraps are reusable, washable, and biodegradable, making them eco -friendly. They're ideal for wrapping sandwiches, covering bowls, or storing cheese and produce. After use, they can be washed with mild soap and cool water, then air-dried for reuse. With proper care, beeswax wraps can last for up to a year, reducing plastic waste and promoting sustainability.

Conclusion

The production and trade of beeswax are integral to various industries, including cosmetics, pharmaceuticals, and food. As a natural product, beeswax offers numerous benefits, such as being a sustainable alternative to synthetic materials. Its trade is influenced by factors like beekeeping practices, environmental regulations, and consumer demand for organic and natural products. Overall, the production and trade of beeswax play a significant role in both local economies and global markets.