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Processing of Honey

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Honey is a natural and almost untreated food produced by bees. Honey is therefore highly regarded by consumers as an authentic, naturally pure and healthy product.
Thus, the honey processing / packaging is reduced only to the careful heating of raw honey

Flow Diagram of Honey Processing

Harvesting and Transport of Raw Honey
↓
Liquefaction
↓
Straining
↓
Filtration
↓
Moisture Reduction
↓
Pasteurization
↓
Cooling
↓
Bottling
↓
Labelling

Thermal Processing of Honey

The thermal processing of honey is carried out with two stages:

- First, honey is heated at approximately 55°C to ensure easiness for handling (liquefaction process).
- Secondly liquefied honey is subjected to more higher temperature at approximately 80°C to destroy yeasts and dissolve crystallization nuclei (pasteurization process).

Liquefaction

According to the Codex Alimentarius and other honey regulations it is forbidden to heat honey as to impair significantly its quality.

- Liquefaction should be done in such a way to minimize the heat damage to honey.
- Liquefaction depends on the concentration of glucose in the honey and crystal form.
- Uncontrolled heating alters the parameters such as Hydroxymethylfurfural (HMF) content and diastase activity unfavourably.

Different Means of Honey Heating for Liquifaction Conventional Jackets

- A second shell is installed over a portion of the vessel, creating an annular space within which cooling or heating medium flows.
- A simple conventional jacket, with no internal components, is generally very inefficient for heat transfer.
- The flow media(water) has an extremely low velocity resulting in a low heat transfer coefficient.
- Heaters are installed outside the double jacketed vat for heating the circulating medium.
- For uniform heating, stirrer is compulsory to stir honey regularly to prevent its overheating along the walls of jacket.
- Due to practical reasons, heating in water bath is used in recipients of up to 25 kg size

Heating by Air Method

- **Heating by air** is also widely used in honey industry.
- When heating of honey, air circulation should be used to prevent overheating.
- **Immersion Heaters** can be placed on the granulated honey, which progressively sink upon honey melting.
- High-quality food-grade stainless steel immersion heater works great in combination with different capacity stainless steel honey storage tanks.
- Honey can be liquefied by placing the vessels on electric plates.
- This type of heating is widely used by small beekeepers and **Not Recommended.**

Straining and Filtration

- According to codex, Honey which has been filtered in such a way as to result in the significant removal of pollen shall be designated filtered honey.
- According to European Directive, filtered honey is obtained by removing foreign inorganic or organic matter in such a way as to result in the significant removal of pollen.
- According to USDA Grading Standards for extracted honey, filtered honey is honey that has been filtered to the extent that all or most of the fine particles, pollen grains, air bubbles, and other materials normally found in suspension have been removed.
- The straining operation to remove suspended solids (including large wax particles) is carried out either manually or by mechanical means.
- The method and the equipment used for straining depend on the size of the operation.
- In small-scale operations, straining is done using cloth or nylon bags, which are frequently cleaned to remove the suspended particles.
- In large-scale operations, the straining operation is combined with the preheating (up to 40°C) operation in a jacketed tank fitted with a stirrer.

Filtration

- The strained honey is further processed using pressure filters. Typically a polypropylene micro filter of 80 µm is used as a filter medium.
- The temperature is maintained between 50–55°C, which prevents the melting of the beeswax.
- Large-scale processors subject honey to coarse filtration, centrifugal clarification, fine filtration, and blending, prior to filling.
- The filtration done carefully so that required pollen count in the honey must be retained.
- The various types of filtration units which are available are filter press, sparkle filters etc…
- **Membrane filtres** are most commonly used.
- **Ultrasonic processing** is an effective means to destroy desirable components such as crystals & microbial cells in honey.

Reason to Reduce Moisture in Honey

- Moisture is one of the most important parameter of honey quality.
- Most of the extracted honeys are having the higher moisture than the prescribed standards because of extraction of unripened honey.
- The amount of water in honey determines its stability against fermentation and granulation.
- Honey having high water content ferments easily with time. So, it is necessary to process the honey by subjecting it to thermal treatment to prevent fermentation by sugar tolerant yeasts.
- Treatment in a closed system minimizes losses of volatile aroma during heating.

Moisture Reduction Equipment in Honey

- **Dehumidifier** is a tool used to control the amount of water vapored in a room. This machine can be either portably or permanently installed in a room. It can reduce the relative humidity (RH) level at honey dryer room. The temperature used is usually around 45 °C, but the drying time is relatively very long.
- **Honey dehumidifier** was designed for the small beekeeper who does not need to work large quantities of the product.
- **Evaporation** is a technique used to evaporate water in a tube by using a pressure below 1 atm or vacuum condition. Furthermore, water evaporate at temperatures less than 100 °C.
- Hot water is discharged in a water jacket around the honey pot to heat the honey.
- The heated honey pumped through a filter with 122 holes uniform in size, 0.5 cm diameter to form a honey stream through which the drying air passes to remove the honey's moisture content.
- The honey flow helps them to increasing the honey's surface to be exposed with the air.
- The maximum drying speed per square meter of honey exposed to drying air at 40°C is 197 g/ hour-m2 while the minimum result (74.8 g/ hour-m2) corresponds to air drying at room temperature 8-17°C.
- In this multiple effect evaporation system, raw honey was preheated (40–45 ºC) and then filtered through 80 lm polypropylene micro-filter.
- This honey was heated up to 60–65ºC in first effect to destroy osmo-phillic yeast cells, held at 60ºC for evaporation of water under vacuum
- Then cooled in third effect before passing into settling tanks for bottling.
- The system had a capacity of processing 300 kg of honey per day.

Pasteurization of Honey

- Honey can be consumed pasteurized or not.
- Honey is low in humidity and high in acidity, means that bacteria cannot survive in it.
- Pasteurization could not overcome the problem of Clostridium botulinum in honey.
- Pasteurization of honey reduces the chance of fermentation and also delays granulation.
- Different Temperature and Time combinations are suggested. Heating the honey to 63°C for 30 minutes or 65.5°C for 30 minutes or temperature be brought to 77° C momentarily and followed by the rapid cooling.

Techniques Used at Lab Scale

1. Infrared heat processing of honey.
2. Microwave heat processing of honey
3. Ultrasound processing
4. Membrane processing of honey

Bottling

- Depending on the market requirement, honey may be bottled directly into small containers for retail sale or into large drums for storage or export to another countries.

- In an effort to appeal to a wide range of consumers, honey is packaged in containers of many different sizes and styles. These include glass, plastic containers, honey tubs, squeeze bottles.
- Like most aspects of honey processing, bottling can involve automation in large operations, or manual labour such as a hand valve on a plastic pail in smaller operations.
- Presence of air bubbles in the packaging containers can provoke nucleation and crystallization of honey. The filling of honey in the bottles done at the high temperature.
- Filling at higher temperatures eliminates air bubbles and avoids air incorporation during packing due to low viscosity.

Labelling

- The label on a honey container in a retail outlet should include the word **"Honey"** or, possibly, an indication of a floral source, such as **"Mustard Honey".**
- It also needs to state the net weight, the name and address of the honey dealer and the FSSAI registration number of the packer, as well as the nutrition facts table.
- The label should also identify the country of origin and indicate whether the honey is creamed, liquid or pasteurized.
- Honey sold at a Apiary or farmers' market does not need to meet the same labelling requirements because it's usually coming directly from the producer.