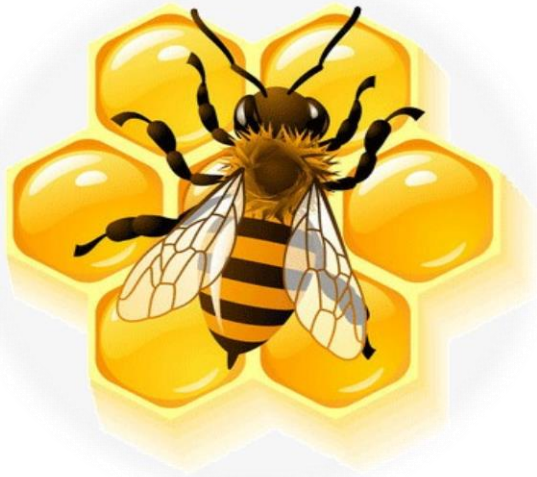


PROCESSING OF HONEY



AATMANIRBHAR BHARAT

**PM Formalisation of Micro Food Processing
Enterprises Scheme (PM FME Scheme)**

HONEY PRODUCTION IN INDIA

India: One of the top 10 honey producing countries.

- European Union- 17 Million beehives, 600,000 beekeepers, 2,50,000 MT honey
- India- 3.5 Million Bee Colonies
- India- 1.05 Lakh Metric Tonnes honey production
- More than 2 lakh bee keepers in India

Per capita consumption of honey: 250g-300g (India) and 2000 g in Germany

(National Bee Board, 2017-18).

STANDARDS FORMING AGENCIES CODEX, EU COUNCIL DIRECTIVES AND FSSAI (INDIA)

- The Codex standard for honey adopted by the Codex Alimentarius Commission (revised 2001), has voluntary application and serves in many cases as a basis for National Legislation.

- The European Council issued Directive 2001/110/EC (EC, 2001), amended 2014/63/EU (EU, 2014) that laid down the production and trading parameters of honey within the Member States of the EU

- .

- FSSAI adopted few from the Codex standards and others from Council Directive.

HONEY

- Natural sweet product produced by bees from the nectar plants (blossom honey) or from secretions of living parts of plants or secretion of insects (honeydew honey) Bees collect, deposit, dehydrate, store and leave in the honey comb to ripen and mature.
(Codex and FSSAI).
- The EU Directive defines honey as “The natural sweet substance produced by *Apis mellifera* “.
- The EU definition states that honey is only honey when it is produced by *Apis mellifera* honeybees.

HONEY CATEGORIES

- **Blossom honey** is obtained predominantly from the nectar of flowers.
- **Honeydew honey** is produced by bees after they collect 'honeydew' – secretions of insects belonging to the genus Rhynchota, which pierce plant cells, ingest plant sap and then secrete it again.
- **Monofloral honey** is where the bees have been foraging predominantly on one type of plant, and is named according to that plant. (> 45% pollen from one plant)
- **Multifloral honey (also known as polyfloral)** has several botanical sources, none of which is predominant,
- **Extracted honey** is the most basic and widespread hive product. It is obtained by centrifuging decapped broodless combs.
- **Pressed Honey** is honey obtained by pressing broodless combs with or without the application of moderate heat.
- **Drained Honey** is honey obtained by draining decapped broodless combs.

HONEY CATEGORIES

- **Comb Honey** which is honey stored by bees in the cells of freshly built broodless combs and which is sold in sealed whole combs or sections of such combs.
- **Chunk Honey** which is honey containing one or more pieces of comb honey.
- **Crystallized or Granulated Honey** which is honey that has undergone a natural process of solidification as a result of glucose crystallization.
- **Creamed (or creamy or set) Honey** is honey which has a fine crystalline structure and which may have undergone a physical process to give it that structure and to make it easy to spread.

BLOSSOM HONEY > 300 VARIETIES

Type	Country	Type	Country
Sunflower	India	Buckwheat	USA
Eucalyptus	India	Lavender	Spain and France
Mustard	India	Manuka	New Zealand
Cotton	India	Rubber	India and Srilanka
Cashew	India	Heather	UK, Greece ,France
Apple	India	Apple	USA and Britain
cherry	India	Avocado	USA , Israel, India
Litchi	India	Clover	New Zealand, Canada



HONEY COLLECTION AT SLIET, LONGOWAL



HONEY PROCESSING FACILITY AT SLIET



FLOW DIAGRAM OF HONEY PROCESSING

Harvesting and Transport of Raw Honey



Liquefaction



Straining



Filtration



Moisture Reduction



Pasteurization



Cooling



Bottling



Labelling

HONEY PROCESSING

- 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 for :
 - Liquefaction
 - Filtration
 - Moisture control (if unripe honey harvested)
 - Pasteurization
 - Packaging

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.

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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 baths is used in recipients of up to 25 kg size.

DIFFERENT MEANS OF HONEY HEATING FOR LIQUEFACTION

- Heating by air is also widely used in honey industry.
- When heating greater amounts 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.

STRAINING AND FILTRATION

- 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 honey 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 should be 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.

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 present 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.

➤ **Dehumidifier** 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 in a vacuum condition. Furthermore, water can evaporate at temperatures less than 100 °C.

➤

MOISTURE REDUCTION CONTINUE....

- Gill et al. (2015) developed a small scale honey dehydrator for Moisture reduction.
- 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.

EQUIPMENTS FOR MOISTURE REDUCTION

- **Wakhle et al. (1996)** developed a honey moisture reduction unit
- which consisted of falling film evaporator.

- In this multiple effect evaporation system, raw honey was preheated (40–45 °C) and then filtered through 80 μ m polypropylene micro-filter.

- This honey was heated up to 60–65°C in first effect to destroy osmo-phillic yeast cells, held at 60°C 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.

EQUIPMENTS FOR MOISTURE REDUCTION

- An another equipment which is used consist of a closed housing with an inlet port on the top side and an outlet port on the bottom edge.
- The honey will enter the inlet port and flows downward across a series of trays arranged in a zig zagged manner up to the outlet port.
- A metal screen is used on each tray to spread the honey evenly throughout the tray. There are a coil and an evaporator heater used to dry and warm the air circulated over the honey layer to remove moisture.
- This process claimed in reduced honey's water content from 20 % to 18.5% with an airflow rate around 28 m³/min. and a temperature used around 49 °C
- The equipment is shown in the picture in next slide. .



MOISTURE REDUCTION MACHINE AT SLIET, LONGOWAL



PASTEURIZATION OF HONEY

- Honey can be consumed pasteurized or not.
- Honey is low in humidity and high in acidity, which means that bacteria cannot survive in it.
- Pasteurization could not overcome the problem of *Clostridium botulinum* in honey. (*explained in next slides*)
- 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.

PROBLEM OF *Clostridium botulinum* IN HONEY

- Very Young children or those with compromised immune systems should consume only pasteurized honey.
- This is because there are a small number of cases each year where spores of *Clostridium botulinum* found in honey have been responsible for botulism poisoning.
- According to the U.S. National Library of Medicine, approximately 110 cases of botulism poisoning occur each year in the United States, mostly from improperly canned food, corn syrup, and honey.
- About 90% of these cases occur in children under six months old.

CLOSTRIDIUM BOTULINUM

- Although the spores of *Clostridium botulinum* cannot grow or make toxin in the acidic environment of honey, they survive in a resting state. If they are eaten by an infant, the spores can grow, reproduce, and make toxins while living in the baby's intestinal tract. The toxins are then absorbed into the child's body and can cause illness.
- Both the actual *Clostridium botulinum* bacteria and the toxins it produces are easily destroyed by boiling for several minutes or by holding them at lower temperatures for longer times. The spores, on the other hand, are extremely resistant. Pressure cooking at 250°F (121° C) for three minutes will kill the spores, as will other combinations of temperature, pressure, time, and acidity.
- The common honey pasteurization process is much less rigorous and could not possibly kill the spores responsible for infant botulism.

TECHNIQUES USED AT LAB SCALE

- Infrared heat processing of honey.
- Microwave heat processing of honey
- Ultrasound processing
- 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, or even 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.

BOTTLING

- Presence of air bubbles in the packaging containers can provoke nucleation and crystallization of honey. The filling of honey in the bottles is normally 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.

LABELLING

➤ 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.

PM FORMALISATION OF MICRO FOOD PROCESSING ENTERPRISES SCHEME (PMFME)

TOTAL OUTLAY: **RS. 10,000 CRORE**

- **2,00,000** FPOs/SHGs/Cooperatives and working micro enterprises to be directly benefitted
- Expected to generate **9 lakh** skilled and semi-skilled jobs
- To be implemented over a **5-yr period from 2020-21 to 2024-25**
- Cluster approach
- Focus on Perishables.

Helpline Number

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