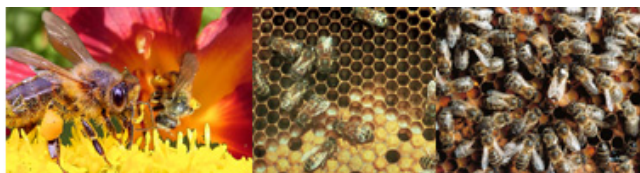


# INFRASTRUCTURE





## Honey Processing Toolkit



# INFRASTRUCTURE

## Infrastructure and processing site layout

When setting up a honey processing industry it is essential that the condition of the building - the materials of construction and its position - are all suitable for food production. The plant should not be located near swamps, ditches or refuse dumps where insects and rodents are likely to be found. The site should allow waste water to drain away freely and have suitable facilities to dispose of waste food and rubbish. A supply of clean water is essential.

Physical layout

Basic services

Equipment

### 1.- Physical layout

Ideally the operational areas of the honey processing industry building should be at ground level, with the raw ingredients entering at one end and the finished goods leaving at the other.

The different operations should be kept separate from each other to prevent contamination. For example, perishable raw materials should be kept separate from non-perishable ones.

Packaging materials should be stored separately from the food items.

If possible, toilets should be located outside the processing building. If they are in the main building, there should be two doors between the processing room and the toilet.

Workers must have access to handwashing facilities with soap and clean towels.

The building should be constructed with smooth walls. The joint between the wall and floor should be rounded for easy cleaning. The building lines should be simple and square, without crevices and small places that can attract dust and may become birds nests. Windows should be covered with mosquito mesh to prevent the entry of flies and other insects.

The floor should be made of good quality concrete and should slope to a central drainage channel so that at the end of the day the whole area can be hosed down.

The drainage channel should be fitted with a heavy iron grating that can easily be removed for cleaning. The outlet of the drain should be covered with wire mesh to prevent rodents entering.

The ceiling and walls must be made from washable and easily dried materials. They must not be absorbent or porous.

The lighting should be natural if possible. If artificial lights are used they must not get in the way of the processing. The bulbs should be protected to prevent glass falling into the products if the lights are broken.

It is important to have good ventilation, especially where heating takes place. Large window openings should be covered with mesh to allow air and natural light into the building, while preventing insects and birds.

## **2.-Basic Services**

Three basic services are required for a basic honey processing operation:

### **Electrical power**

It is preferable to have access to electricity for lighting and for the operation of machinery. The electricity points should be situated high up the walls and away from water supplies so that they do not get wet during hosing down of the building.

### **Drinking water**

Drinking water should be available in sufficient quantities to allow for the safe, hygienic processing of food. Water must be protected from all possible sources of contamination. The storage tank must be covered. Clean water is often a scarce commodity and therefore efforts should be made to conserve it. Clean water must be available at all times. It is recommended that an elevated storage tank is used that is not reliant on the use of electricity. The use of a storage tank allows the water to be treated with a disinfectant. It is recommended that chlorine is added to water as a disinfectant. The recommended dosage is 2 ppm of free chlorine, which is equivalent to 100ml sodium hypochlorite solution per 2000 litres of water. At this level, the chlorine disinfects, but does not affect the taste of the water.

### **Disposal of waste water and material**

Provision should be made for the disposal of waste water and waste material

### **Basic facilities**

A small to medium scale fruit and vegetable processing unit must have the following basic facilities:

#### **Reception of raw material**

The plant must have a special area for the reception and storage of raw material until it is required. This area may simply be a shed or an appropriately designed room. The area should be clean, away from direct sunlight and with control over the temperature and humidity according to the type of material being stored. Care should be taken to ensure that rodents, birds and insects cannot get into the store building. The raw material storage area should not be used for the storage of other products that could contaminate it such as cleaning materials and pesticides. The quality of the finished product is directly dependent on the quality of the raw material. Thus the conditions of the storage area are of great importance. This storage area should have basic equipment such as weighing scales for the reception of raw material, as well as holders for supers containing honeycombs, buckets or drums containing honey. It should contain a freezer or a chamber at low temperature to store pollen in natura and propolis.

## **Processing room**

The processing room is the main place of activity. The different materials used during processing and the various pieces of equipment are kept here. Ideally, the room should be large enough to house all the equipment needed for the various stages, to allow the process to be continuous and improve the efficiency of processing.

## **Quality control**

Quality control operations should be carried out in a separate room. The room should be equipped with basic equipment such as a sink, running water and a bench or table where the tests can be carried out. The equipment for testing should be kept in this room. The pollen and propolis processing should be performed in rooms that are separated from the one of honey processing, except after the final processing of these products, when they can be mixed with honey in the honey processing room using a mixer.

## **Storeroom for finished products**

The storeroom should be clean and airy, free from damp and away from direct sunlight. The temperature of the room should be kept as low as possible to maintain the quality of the stored products. The storeroom should be fitted with shelves to allow neat and tidy storage of the processed foods. Processors should regularly test the quality of the stored products and make sure they rotate the stock, selling the oldest stock first.

## **Other facilities**

Some equipment needs to be stored outside the main processing area, but still accessible to the processor. The boiler or steam generator needs to be housed outside the main processing area to avoid contamination of the foods.

## **Sanitary facilities**

All sanitary facilities - changing rooms, toilets and hand washing areas should be kept separate from the processing area to avoid cross contamination.

## **3.-Equipment**

When buying equipments for processing honeybee products, some care should be taken to decide what is the best for the individuals' specific needs. It is a good idea for buyers to visit trade fairs, manufacturers, equipment retailers and bee products enterprises to see the equipment under action and seek advice from experts.

Several factors that should be considered when buying new equipment include the following:

- the robustness of the equipment
- the simplicity of servicing, cleaning and maintenance
- what spares must be help
- how long it will take to get replacement parts.

There are many different types of equipment available, some of which are essential to the honey while others are optional, labour saving devices. It is important to think carefully about

what is essential and what the plant can manage without. How long it will take to get replacement parts.

The following is a guide of additional equipment available.

### **Uncapping tank**

An equipment that gives support to uncapping of the honeycombs. Constituted of a base for supporting the frames, a draining sieve for cappings and a cross bar to hold the frame during the uncapping. Different uncapping equipments (manual or automatic) are supplied by the market for hobbyists, professional beekeepers or larger enterprises.

### **Honey Extractor**

An equipment receiving the uncapped frames in order to extract the honey from the honeycombs by a centrifuge force that rotates around its own axis. The available extractors are provided with several extraction capacities. The tangential/facial equipment or the radial one, which may be manual or electrical, as well as this last one provided with speed control are available in the market. Usually, the hobby beekeeper use the tangential extractor with capacity for 2 to 8 frames. This extractor type demands more time, since it has restricted space and only a side of one frame is extracted at a time and need to be turned about and extraction procedure should be accomplished again. The radial extractor may be small for 12-32 frames. Large beekeepers usually use an extractor with capacity up to 128 frames. Using the radial extractor, the beekeeper do not need to turn the frame about. Some beekeepers use two extractors: whereas one is extracting, the other one is undergoing the removal of the extracted frames and reloading with another set of uncapped frames.">Honey Extractor

An equipment receiving the uncapped frames in order to extract the honey from the honeycombs by a centrifuge force that rotates around its own axis. The available extractors are provided with several extraction capacities. The tangential/facial equipment or the radial one, which may be manual or electrical, as well as this last one provided with speed control are available in the market. Usually, the hobby beekeeper use the tangential extractor with capacity for 2 to 8 frames. This extractor type demands more time, since it has restricted space and only a side of one frame is extracted at a time and need to be turned about and extraction procedure should be accomplished again. The radial extractor may be small for 12-32 frames. Large beekeepers usually use an extractor with capacity up to 128 frames. Using the radial extractor, the beekeeper do not need to turn the frame about. Some beekeepers use two extractors: whereas one is extracting, the other one is undergoing the removal of the extracted frames and reloading with another set of uncapped frames.

### **Stainless steel sieves AISI 304 or nylon filter**

An utensil that helps the removal of the undesirable particles found after the extraction as higher pieces of honeycombs or some bee that eventually has entered in the processing room. The ideal is to use stainless steel sieve with different meshes and different diameters in line for a more efficient filtering. It will be used for the honey, for melted wax and propolis extract, as being a specific sieve for each process.

### **Wax extracting tank**

This equipment is used for rendering wax residues from old honeycombs using steam chests with a bottom which is screened or perforated and slanted which allows melted wax to pass through and away from the slumgum, keeping the cocoons and other big-sized dirtiness separated from the wax that coming down by gravity toward the bottom and outside together

water . Then, this melted wax separate into a superior layer after cooling, whereas the dirtiness is easily removed. When the beekeeper does not have this equipment, he places the wax inside a container with water at a maximum temperature of 70 ° C. After some time, the dirtiness (cocoons and others) separate from the wax and the wax will be at the upper part of the block and will be separated from dirtiness as soon as the medium is cool.

### **The tank**

It is provided with rotary spades that homogenize the honey, when the purpose is to standardizing the color, aroma and flavor of the product as well as to produce honey composite. Some mixers are built with double walls and provided with controlled heating systems to facilitate the homogenization.

### **Settling tank**

This is a container for the reception of the honey after the extraction. The purpose is allowing the honey to "rest" for a certain period (10 days at maximum). Along this time, eventual air bubbles produced during the honey extraction as well as some particles still in the honey will migrate up to form a foam containing air bubbles, pollen particles, small wax pieces, died larvae and adult bees, and other detritus, therefore becoming easily removed. In fact, those higher dirtiness must be extracted through filtration accomplished after the centrifugation and when putting the honey in the settling tank. The same equipment is used to settle honey composite, however the permanence time is usually 12 hours.

### **Stainless steel table**

It is made of stainless steel and is used for different purposes: to aid packaging the products, as well as to allow the accomplishment of the stages such as the propolis selection, pollen cleaning and others. The sizes to be acquired will depend on the necessary space for each activity.

### **Sachet machine**

This machine is provided with a pressurized, AISI 304-stainless steel reservoir (50 liters), as well as a stainless steel, bench-type table with 3m length and a connection accessory set. It is used to packaging honey in sachets, which may be sold separately or little strips.

### **Freezer**

The horizontal model with 310L capacity may be acquired. The freezers will be used for the storage of both propolis and pollen.

### **Propolis extractor tank**

It is made of stainless steel 304 and has an agitator provided with a panel with programmable temporizer for cyclical operation of the extractor (for instance, it keeps turned on for 3 min each hour). The extraction can be made by manual agitation using small bottle containing 7 parts of ethanol 70% and 3 parts of crude propolis. For the first process extraction could be finished in hours or a few days but for manual process at least 30-60 days. ">Propolis extractor tank.

It is made of stainless steel 304 and has an agitator provided with a panel with programmable temporizer for cyclical operation of the extractor (for instance, it keeps turned on for 3 min each hour). The extraction can be made by manual agitation using small bottle containing 7

parts of ethanol 70% and 3 parts of crude propolis. For the first process extraction could be finished in hours or a few days but for manual process at least 30-60 days.

### **Wax sheets production**

Wood plate and liquid wax bath for the production of single or multiple wax sheets by hand-dipping moist wooden boards into the molten wax. For multiple sheets the plates are sustained by a rotary hanger that maintains the boards at rest until the wax is dry. It is advisable that it be provided with automatic temperature control by thermostat in the wax melter so that the temperature will not rise above 70 ° C. Today, there are automatic rolling mills laminators that produce the laminated wax in rolls.

### **Bee wax foundation roller**

It is constituted of metallic rolls with printed molds, preferentially covered by tin alloy to avoid the sheets to be grasped into the equipment. The bearings should be armored and autolubricated rollers. Special attention should be paid to the impression quality of the cylinders, because the final product will be directly affected if those cylinders are not well molded.

### **Pollen dryer**

This is an appropriate equipment for drying the pollen through forced flow of hot air. Since the drying should occur around 42°C, it is important to verify the maximum temperature. The drying processing and the other ones following this procedure should be accomplished in environments with air humidity below 60%.

### **Small Equipment**

In addition to the large pieces of equipment, there are various smaller items, some of which are essential and others that facilitate the process.

The following are some small equipment:

#### **Uncapping fork**

An utensil with several sharp borders and stainless steel extremities, and plastic grasping cable, used for cutting the honey capping wax.

#### **Uncapping Knife**

It is used for cutting the honey capping wax, as well as scratching the propolis from combs.

#### **Bucket**

It is used for storing the products. The ideal is to acquire a stainless steel utensil provided with lid, and capacity for 25 kg, but may be used a plastic food grade. ">Bucket

It is used for storing the products. The ideal is to acquire a stainless steel utensil provided with lid, and capacity for 25 kg, but may be used a plastic food grade.

#### **Tweezers**

It is used for initial cleaning of the pollen. It should be made of metallic material, preferentially stainless steel. It is easily found in drugstores.

## Nylon bag

It is used to optimize the filtering process of the propolis extract and honey. It should be used together with the stainless steel AISI 304 sieves, as being placed on its mesh.

## Pallets

It is used to impede the products and packagings to be in direct contact with the ground. Although the wooden pallets are more used and cheaper, they are not the more recommended ones because of the possibility for product contamination. Likewise there are plastic and metallic pallets.

## Pallets

It is used to impede the products and packagings to be in direct contact with the ground. Although the wooden pallets are more used and cheaper, they are not the more recommended ones because of the possibility for product contamination. Likewise there are plastic and metallic pallets.

## Metallic shelf

A metallic shelf provided with six shelves might be acquired, with six racks to aid the organization of objects. ">Metallic shelf

A metallic shelf provided with six shelves might be acquired, with six racks to aid the organization of objects.

## EQUIPMENT SUPPLIERS

The information contained here is adapted from the ITDG publication Small-scale Food Processing (see bibliography number 11). Please note that the list is far from exhaustive. There are many more suppliers of equipment that we could not locate. Contact numbers change, suppliers go out of business and new suppliers emerge. Please inform FAO if you know any suppliers that would like to be included in this database.

FAO and UNIDO do not endorse any of these suppliers or manufacturers and accept no responsibility for the products offered for sale.

Manufacturer	Country	Main equipment
<b>Manufacturer</b>	<b>Country</b>	<b>Main equipment</b>
Apiários Seiva das Flores	Brazil	Uncapping and honey extractors, homogeneizer and settling tanks
Apiagro	Brazil	Descrystalizer, uncapping tank, honey extractors, homogeneizer and settling tanks
Apilani	Brazil	Heat Treatment; wax melters and comb foundation rollers
Apismatic	Brazil	Uncapping and honey extractors, homogeneizer and settling tanks
Cia da Abelha	Brazil	Uncapping and honey extractors, homogeneizer and settling tanks
Cylindro Alveolador Apic. Ltda.	Brazil	wax melters

Frigomel	Brazil	Descristalizer, uncapping tank, honey extractors, homogeneizer and settling tanks
Imesul	Brazil	Descristalizer, uncapping tank, honey extractors, homogeneizer and settling tanks
Cameroon Packing Company	Cameroon	Pack-seal
Helepac	Cameroon	Pack-seal
Icrafon	Cameroon	Pack-seal
Sofecam	Cameroon	Pack-seal
China Hubei Wuhan Yimin Co. Ltd	China	Extractors; Quality Control
Orient Bee Supplies	China	Extractors
Bellingham and stanley Ltd.	England	Quality Control
Thomas Apiculture	France	Descristalizer, uncapping tank, honey extractors, homogeneizer, settling tanks, wax processing
Anel Standard Co	Greece	Descristalizer, uncapping tank, honey extractors, homogeneizer, settling tanks, wax processing
Anand Refrigeration Co. Private Limited	India	cold storage
Adair Dutt & CO	India	Quality Control
Arihant Corporation	India	Quality Control
Harvest Eletronics Ltd.	India	Quality Control
HMG India	India	Cold Storage
Krishna Products	India	Quality Control
Pearl Packaging	India	Pack-seal
Rinac India Limited	India	cold storage
Superpack Packaging Machines Rt. Ltd.	India	Pack-seal
Lega S.r.l.	Italy	Heat Treatment; wax melters and comb foundation rollers
Ceracell Beekeeping Supplies Ltd	New Zealand	Extractors
Commercial Refrigeration Wholesale	New Zealand	cold storage
Ecroyd Beekeeping Supplies Ltd.	New Zealand	wax processing; Pack-seal; Quality Control
African Glass	Nigeria	Pack-seal
Nicapaco Ltd.	Nigeria	Pack-seal
Poly Products Nig Ltd.	Nigeria	Pack-seal
Adelika S.r.l	Romania	Descristalizer, uncapping tank, honey extractors, homogeneizer, settling tanks, wax processing
Soseplast	Senegal	Pack-seal
Honey Badger Honey Farm	South Africa	Descristalizer, uncapping tank, honey extractors, homogeneizer, settling tanks, wax processing
Beekeeping	UK	Descristalizer, uncapping tank, honey extractors, homogeneizer, settling tanks, wax processing
Maisemore Apiaries	UK	Extractors
Michael Jay Beekeeping Supplies	UK	Descristalizer, uncapping tank, honey extractors, homogeneizer, settling tanks, wax processing
Park Beekeeping Supplies	UK	Extractors and clean

Paynes Southdown Bee Farms Ltd.	UK	Descristalizer, uncapping tank, honey extractors, homogeneizer, settling tanks, wax processing
The Honey Shop	UK	Descristalizer, uncapping tank, honey extractors, homogeneizer, settling tanks, wax processing
Thorne	UK	Descristalizer, uncapping tank, honey extractors, homogeneizer, settling tanks, wax processing
Bee-Commerce	USA	Descristalizer, uncapping tank, honey extractors, homogeneizer, settling tanks, wax processing
BeeMaid Bee Store	USA	Descristalizer, uncapping tank, honey extractors, homogeneizer, settling tanks, wax processing
Betterbee	USA	Descristalizer, uncapping tank, honey extractors, homogeneizer, settling tanks, wax processing
Dadant and Sons, INC.	USA	Descristalizer, uncapping tank, honey extractors, homogeneizer, settling tanks, wax processing
GloryBee Foods INC.	USA	Extractors
Honey-n-me Bee Farm	USA	Desoperculação&Fragmentação; Extração;Quality Control
McCormick Fruit Tech	USA	Quality Control
QA Supplies, LLC.	USA	Quality Control
Ruhl Bee Supply	USA	Uncapping and honey extractors, homogeneizer and settling tanks
Whirlpool Corporation	USA	cold storage

### Annex 1

n. of objective	Budgets posts	Unit	Unit price	Quantity	Total	Co-financing
	Supplies and services rendered					

#### 1. PERSONNEL

##### 1. Expatriate/local personnel

- a)
- b)

##### 2. Local personnel

- a)
- b)

##### 3. Allocation per diem

- a)
- b)

---

**Unit price sub-total**

---

#### 2. SERVICES AND EQUIPMENT

##### 1. Standard equipment

- a)
- b)

**2. Specific post-harvest or food processing equipment**

- a)
- b)

**3. Travel transport**

- a)
- b)

**4. Training and publications**

- a)
- b)

**5. Publications + documents**

- a)
- b)

**6. Outside experts**

- a)
- b)

---

---

**Cost-price sub-total**

---

**3. AT ALL INCLUSIVE PRICE**

**1. Administrative costs**

- a)
- b)

**2. Contingencies**

- a)

---

---

**Total price sub-total:**

---

<b>TOTAL</b>
--------------