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**Apiary management handling and  
processing of bee products — Code of  
practice**



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## Foreword

Rwanda Standards are prepared by Technical Committees and approved by Rwanda Standards Board (RSB) Board of Directors in accordance with the procedures of RSB, in compliance with Annex 3 of the WTO/TBT agreement on the preparation, adoption and application of standards.

The main task of technical committees is to prepare national standards. Final Draft Rwanda Standards adopted by Technical committees are ratified by members of RSB Board of Directors for publication and gazettment as Rwanda Standards.

DRS 153 was prepared by Technical Committee RSB/TC 027, *Beekeeping and Beekeeping products*.

In the preparation of this standard, reference was made to the following standard:

- 1) US 641:2006, Code of practice for apiary management, handling and processing of bee-products.

The assistance derived from the above source is hereby acknowledged with thanks.

This second replaces the first edition (RS 153:2012), which has been technically revised.

## Committee membership

The following organizations were represented on the Technical Committee on Beekeeping and Beekeeping products (RSB/TC 027) in the preparation of this standard.

Association Rwandaise pour la promotion du Developement Integre (ARDI)

Institute Superieur d'Agriculture et d'Elevage (ISAE) Ministry of Agriculture (MINAGRI)

Rwanda Agriculture Board (RAB)

Rwanda Environment and Development Organization (REDO)

Stichting Nederlandse Vrijwilligers (SNV)

Rwanda Standards Board (RSB) – Secretariat

## Introduction

One of the quality problems associated with honey is crystallization and this normally occurs in two ways, that is:

- a) when honey remains too long (long storage of combs) within the colonies and
- b) by natural processes depending on the type of nectar

The latter is related to the concentrations of sugars mainly glucose and fructose. Crystallized honeys can be harvested by either pressing the combs or by using heat to separate the wax from the honey. This technique, when used, causes inferior quality honey.

The use of high temperatures (or heat) during the separation of honey from the wax has a negative influence on the quality of honey. At high temperatures enzyme activities within honey are decreased while at the same time the formation of hydroxymethylfurfuraldehyde (HMF) is promoted. Enzyme activity and HMF are some of the critical parameters laid down in this standard.

Furthermore, the handling practices also influence the quality of honey. Harvested honey, honey in combs or extracted has a potential to absorb moisture under given conditions if it is not stored in airtight containers. When honey is exposed to air, a gain or loss in its moisture content will take place, depending upon the temperature, and the moisture content of the air and the vapour pressure of the water in the air, which is usually expressed as relative humidity. For each honey a relative humidity exists at which no gain or loss of moisture takes place. This so-called equilibrium relative humidity will vary with moisture content of the honey. Because of the high viscosity of the honey, moisture absorbed at the surface can diffuse only very slowly throughout the mass, so there may be a relatively rapid dilution at the surface and fermentation starts. On the other hand, when honey is exposed to a relative humidity lower than its equilibrium value, drying will take place leading to crystallization.

Another quality problem associated with honey is the off-flavours or smoky taste and aroma arising from excessive use of smoke during harvesting. Such honeys are characterized by an abnormal and non-typical taste and aroma and are not desirable by consumers and therefore not marketable on the international markets. These are normally downgraded and thus they cannot fetch a premium price on the international market.

Overall, for honey to be considered as a food product, its safety has to be assured through hygienic handling to avoid chemical and microbiological contamination. In particular, the premises under which it is processed should meet the hygienic requirements for food processing enterprises. Similarly, the containers used in the handling of honey during harvesting, transportation, processing and storage should conform to food grade requirements.

# Apiary management handling and processing of bee products — Code of practice

## 1 Scope

1.1 This Code of Practice applies to apiary management operations like sitting and maintenance of hives, harvesting and processing of bee products.

1.2 This code of practice does not cover specifications of products like honey, wax, and hives among others.

## 2 Normative references

There are no normative references in this document

## 3 Terms and definitions

For the purposes of this standard, the following terms and definitions apply

### 3.1

#### apiary

place where a number of honey bee colonies are kept

### 3.2

#### honey bee

insect scientifically referred to as *Apis mellifera* or *Trigona* species

### 3.3

#### bee hives

hollow closed containers purposely made to house bees, and these include:

- a) traditional hives with fixed combs e.g. logs, woven hives;
- b) top bar hives with movable combs, commonly called Kenya Top Bar (KTB) hives; and
- c) frame hives with movable combs, such as the Langstroth hive or Dadant hive.

### 3.4

#### **honey bee colony**

Honey bee family consisting of thousands of individual bees living together as one social unit

### 3.5

#### **traditional bee keeping**

use of traditional techniques of beekeeping, harvesting and processing honey and other bee products, using various traditional styles of hives and other equipment

### 3.6

#### **modern (improved) beekeeping**

keeping of bees in hives having top bars or provided with frames on which honey combs are anchored by the bees

### 3.7

#### **honey**

natural sweet substance produced by honeybees from nectar of plants or from secretions of living parts of plants or secretions of plant sucking insects on the living parts of plants, which the bees collect, transform, deposit, dehydrate, store and leave in honey combs to ripen and mature

### 3.8

#### **brood**

any immature stage of a honeybee including the egg, larva and pupa or any honeybee which has not emerged from its cell in a honeycomb

### 3.9

#### **beeswax**

wax produced by honey bees and used to build the comb

### 3.10

#### **bee space**

gap large enough for bees to walk and work for example, space between two parallel combs or between a comb and the wall of the hive

**3.11****bee products**

include honey, beeswax, propolis, bee-venom, royal jelly and bee-bread

**3.12****wax foundation or comb foundation**

wax sheet provided to guide the bees in the construction of the honey comb

**3.13****royal jelly**

special secretion of the young worker bees used to feed the queen larvae during the early stages of development

**3.14****propolis**

resinous substances collected by bees from specific plant species for purposes of hive sanitation

**3.15****pollen**

fine to coarse powder containing the microgametophytes of seed plants, which produce the male gametes (sperm cells).

**4 General requirements for bee hives****4.1 Requirements during the construction of traditional hives**

**4.1.1** Traditional hives should be properly constructed from durable materials, which have no scent that may affect the bee colonization process.

**NOTE** There are number of materials used in the construction of traditional hives, including, eucalyptus, tree leaves, bamboo, reeds, palm, clay or earth, brick or log.

**4.1.2** Where hives are constructed from logs, the logs shall be well dried before use.

**4.1.3** The ends of the local hives or log hives shall be covered with woven materials or a metal piece.

**4.1.4** After construction, the interior of a log shall be smoothened by sanding, then cleaned and properly stored in a cool dry place.

**4.1.5** The dimensions of beehives should provide an environment that meets the desired conditions for the bees. Similarly, the hives should be constructed in such a manner that they are easy to inspect (RS 163; 2018).

**NOTE** In some instances, smoky wax is used for purposes of smoothening the interior of traditional hives to attract swarming colonies. This practice normally leads to formation of off-flavours in bees and is therefore not encouraged

## **4.2 Requirements during construction of improved and modern hives**

### **4.2.1 General requirements for hives include the following**

a) Modern hives shall be constructed from long lasting or durable well-seasoned dry timber, which is free from knot holes, and cracks. The timber shall have good smell that is not offensive to the bees. Timber obtained from the following trees is highly recommended for this purpose:

- 1) *Eucalyptus spp*
- 2) *Grevelia spp*
- 3) *Maesopsis eminii* ( Umuhumuro);
- 4) *Cedrella spp* (cedar)

b) During construction, well-seasoned and planed timber shall be used, and all sections shall be glued and securely nailed. The sizes of common nails recommended for use during construction include:

- 1) 50 mm for general use;
- 2) 2 mm to 50 mm at each corner; and
- 3) 25 mm for the corrugated iron sheets, sides and underside;

c) All splinters shall be removed from the bee holes and all cracks and gaps filled with suitable gap filler;

d) Neither should the timber used for the construction of the hive nor the hive after construction be out painted or applied any wood preservative.

Note: The paint to be used should be exterior grade polyurethane; gloss; semigloss, or satin.

### **4.2.2 Specific requirements for modern hives include the following**

a) Modern hives shall be properly constructed. The bars or frames shall fit properly into the main body of the hive. When the hive is fully assembled, the bars/frames shall provide for adequate space to enable the bee construct honeycombs;

- b) The overall top cover of the hive shall fit properly on the hive. It shall provide for easy removal during inspection and harvesting and shall prevent the hive from adverse weather conditions like rain;
- c) Top-bars or frames shall be provided with a base material in the form of beeswax to act as a bait and therefore promote early colonization. In the case of top bars, this may be a thin coating of wax along the bottom rib, while for frame hives, the frames fitted with foundation.
- d) For other specification for beehives can be found in RS 163

## 5 Requirements for establishing an apiary

### 5.1 Sitting, display and installation of hives

Before hives are installed at any site they shall be well baited with beeswax, to enable faster colonisation by the bees.

Note: A hive can be suspended, for example between two trees or from sturdy branches of big trees. It can also be installed on a platform or a rock. This is a decision that must be made by the individual beekeeper.

#### 5.1.1 Criteria for selection of a site for establishing an apiary

The following factors shall be taken into consideration when selecting a suitable site for an apiary:

- a) The site shall be easily accessible by both the bees and the beekeeper.
- b) The site shall be hygienic with no potential sources likely to contaminate the forage especially agrochemicals. There shall be low frequency of insecticide application in the area.
- c) The site shall neither be water logged nor in a dense damp forest.
- d) There shall be adequate number of flora (forage source) to serve as a source for nectar and pollen, a good source of shade, in any case the hive should be away from direct sunlight and have a source of water, good air circulation but free from excessive effect of winds.
- e) The site shall be located far from public and animals' areas such as schools, hospitals, industries, restaurants.

#### 5.1.2 Recommended practices during installation of hives

During the installation of hives, the following practices shall be taken into consideration:

- a) Before installation of hives, the site shall be slashed, fenced off and protected from the intrusion of animals and humans.
- b) Apiary shall be sited 500 m away from the next beekeeper site and 100 m from public and livestock places

- c) The hives shall be protected from pests especially termites, black ants and the area shall be slashed to keep away fire.
- d) Hives shall be installed on strong poles or poles with capability to germinate. To enable ease of inspection and harvesting, hives shall be sited at the waist level from the ground. Where germinating poles have been used, pruning shall be done regularly to reduce possibilities of pest infestation.
- e) The wire used for hanging hives shall be smeared with grease to prevent attack of ants that could destabilize the colonies

## **5.2 Hive deployment (disposition)**

Hive deployment may be in one of the following patterns:

- a) straight line;
- b) T-Pattern;
- c) zigzag pattern; or
- d) cross pattern.

## **6 Inspection of apiaries and beehives**

### **6.1 Inspection of apiaries**

An apiary shall be inspected:

- a) to ensure that the surroundings are not overgrown with grasses, and in any case these shall be slashed;
- b) for the presence of pests/predators especially along the supporting poles, wires or even on the outside of the hive itself; and
- c) for the presence of water in the containers provided as the water source.

Note: Morning or evening hours are considered as being suitable for inspection purposes due to relatively low temperatures and at these times of the day, bees are calmer and less aggressive.

### **6.2 Inspection of modern hives**

**6.1.1** At regular intervals, the hives may be opened for internal inspection and this shall be done in a calm manner (without making any excessive noise).

**6.1.2** During an early period of colonisation, regular inspection (once a week) is recommended so as to check on the comb construction. After this, the hives shall be inspected at regular intervals two to three times

a month, to check on progress of colonisation, or any disturbances that could have occurred to the colonised hive.

**6.1.3** For proper inspection of modern hives the following steps shall be followed:

- a) With a hive tool or knife, remove a couple of bars from the rear side to create working space.
- b) Examine a bar at a time by looking at one side first and then the other side and put it back in its original position on the hive.
- c) Hold the bar with combs firmly between thumb and next two fingers, vertically above the hive to avoid its breakage and dropping the queen outside the hive.
- d) Avoid crushing the bees as this triggers the release of pheromones which provokes other bees into aggressive action including attack and stinging action.
- e) Combs which are constructed together or fastened to the walls of the hive or across the hive shall be cut off with a knife and the bees allowed to construct the comb afresh.

**6.1.4** During inspection the following shall be noted:

- a) the strength of the colony, observing the brood, eggs, larvae and pupae;
- b) the presence of the queen. In case she is hiding, the newly laid eggs are an indicator of its presence;
- c) prolificacy of the queen, that is, whether she is laying enough eggs or not;
- d) the health status of the colony, especially the presence of bees diseases; the indicators of bee diseases include physical observation of the parasite in the hive or on the bees, bees becoming less active, the number of eggs laid by the queen bee becoming progressively less than normal, weak colony, a very low number of colony members, low hive productivity, abscondment and/or swarming.);
- e) the food stores (honey and pollen);
- f) maturity of honey as indicated by capping of the honey cells. At least three quarters of a comb shall be capped;
- g) the adequacy of space for the available bees; in case it is inadequate, remove some brood combs and replace with empty bars; and
- h) indicators of swarming which include construction of many queen cells. In this case, separate some and provide more room as long as the queen is still present.

## **7 Harvesting of honey**

### **7.1 General**

When still in a hive, honey is a perfect natural product and therefore requires proper handling during harvesting, to avoid the lowering of quality. During harvesting at least 3/4 sealed/capped combs shall be harvested and then sorted according to colour of the comb.

It is also a good practice for the farmer to keep a bee calendar which shall provide guidance on the time when harvesting is expected to take place. The bee calendar should among others indicate the flowering regime of the plants, time of colonisation, time of siting, etc.

### **7.2 Indicators and techniques used for assessing the presence of mature honey in the hive**

The indicators for the presence of mature honey in a hive include the smell of honey from the hive; clustering of bees outside the hive; bees are observed not to be carrying pollen; bees become more aggressive; or the honeycomb being fully capped or sealed during inspection.

#### **7.2.1 Observation of the behaviour of the flowering plants**

The behaviour of the local flowering plants can be very useful in determining when honey may be harvested with maximum results. Mature honey can be obtained when the local flowering plants drop most of the flowers. At this time the bees have capped most of the honey in their nest.

#### **7.2.2 Observation of the colonies**

The beekeeper should always observe the colonies for indicators of bees being ready to swarm and these include ceasing of brood rearing as characterized by foraging bees sending little or no pollen into the hive. Few bees are seen at the entrance during the day; but most of the bees continue buzzing and ventilate the hive at night.

#### **7.2.3 Inspection of the honeycomb**

During inspection, the honey cells are found to be capped. The hive smells of honey when it is approached. The guards at the entrance become more aggressive than ever and send out patrols to attack any potential intruder loitering in the vicinity. The population of the hive is now at its peak.

### **7.3 Preparation for harvesting of honey**

#### **7.3.1 Inspection of the apiary**

The apiary shall be inspected to ensure that the conditions are conducive to harvesting of honey; especially the environment should be hygienic and not polluted with agrochemicals, human or animal waste or garbage in general.

### 7.3.2 Preparation of equipment

Before the harvesting of honey, all equipment such as airtight buckets, knives, etc that may come into direct contact with the product shall be washed with potable water and properly dried (should be suitable for use, that is, food grade).

## 7.4 Techniques for honey harvesting

### 7.4.1 Equipment for honey harvesting

The tools for harvesting include clean airtight honey containers, knives, bee brush or quill feather and hive tool.

- a) Honey containers may be made of earthenware, stainless steel, or airtight buckets, but shall always be rustproof.
- b) Safety gear shall include overall, gloves, bee-veils, gumboots and a torch.

### 7.4.2 Preliminary preparations

After inspecting the apiary and the hives, steps shall be taken to ensure that all the required equipment indicated in 7.4.1 is prepared and made available before harvesting can start.

### 7.4.3 General harvesting techniques

These are applicable to all types of hives and include the following:

- a) Wear protective clothing: overall, veils, gloves, boots
- b) Select only combs that are either full or three quarters full of ripe honey. When such a comb is found, brush any bees on it into the hive and use a knife to cut the comb honey away into an airtight bucket. Close the beaveucket immediately after the honeycomb is put in.
- c) Carry on with the harvest until combs containing honey and brood are reached and at this point harvesting should be stopped as mature honey is finished from the hive.
- d) Some combs may not be easy to remove because the bees may have attached them to each other. This usually happens when inadequate space was left between the top-bars. In this situation a hive tool or knife shall be used to separate them.
- e) In hives where the hive entrance is located in the mid-section (rather than at the end), honey is always found on both sides of the entrance. Harvesting shall start on one side of the entrance, after which treat the other side in the same manner, but leaving ten combs in the middle. The bees will then work faster to produce the next honey crop than if all honeycombs were taken away.
- f) After removing the surplus honey, rearrange the top-bars carefully in the same manner as before. If bees are rushing out between top-bars, avoid crushing them unnecessarily. Then close the hive carefully, making sure the lid is firmly placed on the hive.

#### **7.4.4 Specific requirements for harvesting of honey from traditional hives**

In case of traditional hives, open the hive and cut the ripe honeycombs from the rear side of the hive as the brood is usually found near the entrance. Do not cut out honey mixed with brood combs.

### **7.5 Precautions during harvesting**

#### **7.5.1 General precaution**

When stung during the harvesting process, you should move away from the location as far as possible before removing the sting. As soon as you are sure that the distance is safe, then remove the sting by scrapping it off with a hive tool, knife or with a finger nail. Never remove it by squeezing as this leads to venom release into the flesh which leads to more swelling of the body and releasing of pheromones that attract more bees into stinging action and attack.

#### **7.5.2 Precautions while harvesting at night**

Harvesting at night requires a source of light, however depending on the source of light there are various precautions that have to be taken to ensure that the desired quality of honey is achieved while at the same time ensuring that the colonies are not destabilised. It is therefore important that all necessary precautions are taken to ensure that:

- a) as few bees as possible are burnt to death by the lanterns or hive torches that are used;
- b) the loss of brood combs shall be minimised as much as possible;
- c) accidental crushing of bees between top-bars shall also be minimised; and
- d) the bars are properly fitted.

#### **7.5.3 Precautions while harvesting in daylight**

One simple and effective system for harvesting honey or controlling the brood nest with little or no danger, even during the hottest hours of the day, makes use of the fact that foraging bees always return to the site of their hive, even if the hive is no longer there. To harness this fact, the following precautionary steps may be taken during harvesting:

- a) Bring along to the site an empty hive and a container with a lid for carrying the harvested honey.
- b) Wear protective clothing: overall, veils, gloves, boots properly
- c) Carry away the hive from the site, in the direction opposite to the flight runway, and placed on a platform (or on the ground) at least 50 m from the nearest hive in the apiary. The empty hive is left at the hive site to serve as a temporary home for any returning foragers or for any bees that escape from the moved hive.

- d) Working as quickly as possible in order to avoid robber bees, which can otherwise cause trouble, carry out his harvesting or control operations in the normal manner.
- e) When the work is completed, the hive is closed and carried back to its original position, and the empty hive is removed. Any bees in it, or members of the colony waiting outside, will then rejoin the hive.

## **8 Processing of the various types of honeys**

### **8.1 Processing of comb honey**

**8.1.1** the cut comb shall be processed (cutting and packaging) from selected pieces of sealed, clean and undamaged combs.

**8.1.2** In case of frame hives, honey shall be produced from frames which do not contain strengthening wire.

### **8.2 Processing of strained honey**

**8.2.1** Strained honey shall be prepared from combed honey by uncapping the comb, followed by breaking the comb into pieces and straining using a clean cloth of mesh 500 microns or 200 microns (the use of unsealed combs having unripe honey or pollen is not advisable; as it may lead to deterioration in quality).

**8.2.2** Where framed honey combs are to be processed using a centrifuge, the combs shall be uncapped using a knife previously dipped in warm water. The frames shall then be put in a centrifuge extractor to allow the dripping or separation of honey from the uncapped comb.

### **8.3 Storage of processed honey**

After processing, the product shall be kept in airtight containers. The containers of light color are recommended so as to keep them hygienically safe.

## **9 Plant construction and layout**

### **9.1 Requirements for plant location, size and design**

The building and surrounding area shall be:

- a) such as can be kept reasonably free of objectionable odours, smoke, dust, or other contamination;
- b) of sufficient size for the purpose intended without crowding of equipment or personnel;
- c) of sound construction and kept in good repair;
- d) of such construction as to protect against the entrance or harboring of insects or birds or vermin; and

e) so designed as to permit easy and adequate cleaning. In areas experiencing high concentrations of airborne pollutants, equipment shall be used to remove pollutants from the air blown across or through the product.

## **9.2 Requirements related to sanitary facilities and controls**

### **9.2.1 Separation of processes**

**9.2.1.1** Raw material handling areas are those areas where raw materials are received or stored shall be so separated from areas in which final product preparation or packaging is conducted as to preclude contamination of the finished product.

**9.2.1.2** Processing and storage areas are areas and compartments used for storage, manufacture or handling of edible products and shall be separate and distinct from those used for inedible materials. The food handling area shall be completely separated from any part of the premises used as living quarters as stated in RS CAC/RCP 1, code of practice- general principles for food hygiene

### **9.2.2 Lighting and ventilation**

**9.2.2.1** Premises shall be well lit and ventilated. Light bulbs and fixtures suspended over food in any step of preparation shall be protected to prevent food contamination in the case of breakage.

**9.2.2.2** Good ventilation is important to prevent both condensation (which may drip into the product) and mould growth in overhead structures which growth may fall into the food.

### **9.2.3 Toilet-rooms and facilities**

**9.2.3.1** Adequate and convenient toilets shall be provided and toilet areas shall be equipped with well closing doors.

**9.2.3.2** Toilet rooms shall be well lit and ventilated and shall not open directly into a food handling area. They shall be kept in a sanitary condition at all times.

**9.2.3.3** There shall be associated hand-washing facilities within the toilet area and the notices shall be posted requiring personnel to wash their hands after using the toilet.

## **9.3 Requirements for equipment and utensils**

### **9.3.1 Materials**

All food contact surfaces shall be smooth, free from pits, crevices and loose scale, nontoxic, unaffected by food products, and capable of withstanding repeated exposure to normal cleaning and non-absorbent unless the nature of a particular and otherwise acceptable process renders the use of a surface, such as wood, necessary.

### 9.3.2 Sanitary design, construction and installation

Equipment and utensils shall be so designed and constructed as shall prevent hygienic hazards and permit easy and thorough cleaning. Stationary equipment shall be installed in such a manner as shall permit easy and thorough cleaning.

### 9.3.3 Equipment and utensils

Equipment and utensils used for inedible or contaminating materials shall be so identified and shall not be used for handling edible products.

### 9.3.4 Hand-washing facilities

**9.3.4.1** Adequate and convenient facilities for employees to wash and dry their hands shall be provided wherever the process demands. They shall be in full view of the processing floor.

**9.3.4.2** Single-use towels are recommended, where practicable, but otherwise the method of drying shall be approved by the official agency having jurisdiction. The facilities shall be kept in a sanitary condition at all times.

## 10 Plant facilities and operating requirements — Environmental hygiene

Buildings and equipments shall be designed, constructed, maintained and cleaned to standards that ensure the safety and quality of the ingredients and finished product throughout the entire process.

### 10.1 Floors

**10.1.1** The design of the floors shall permit easy cleaning

**10.1.2** The floors shall be smooth and free from cracks including open joints. They shall have adequate drainage slopes to direct any water towards drainage channels. There shall be no back flow from the drainage to the production areas.

### 10.2 Walls, doors and windows

**10.2.1** All walls shall be impermeable, smooth, and easy to clean. All finishes shall be properly applied and maintained. Painted surfaces shall not be allowed to deteriorate or flake. Paint used shall be designed for food production areas.

**10.2.2** Mesh screens shall be put on all windows to avoid insects.

**10.2.3** The doors opening from the production areas shall remain closed at all the times The doors shall be sealed at the bottom completely to avoid entry of insects to the production areas. Rubber may be used or any suitable material.

**10.2.4** The walls, doors and windows shall be cleaned regularly.

## 10.3 Factory perimeters

**10.3.1** Outside areas shall be maintained in a sound condition with adequate drainage. Areas shall be kept clean and tidy at all times and debris, old equipment, pallets etc shall not be allowed to accumulate.

**10.3.2** Rubbish bins shall be covered, emptied regularly, and maintained in a clean condition.

## 11 Good Manufacturing Practices

### 11.1 General

Good Manufacturing Practices (GMP) encompasses many aspects of procurement, manufacture, distribution and sale, which potentially affect quality and integrity. Personnel hygiene and environmental hygiene shall be controlled. The following defines GMP in key areas.

### 11.2 Management of personnel health and hygiene

#### 11.2.1 Personnel health

**11.2.1.1** Plant management shall ensure that any person afflicted with infected wounds, sores, or any illness, notably diarrhea, immediately report to management.

**11.2.1.2** Management shall take care to ensure that no person, while known to be affected with a disease capable of being transmitted through food, or known to be a carrier of such disease microorganisms, or while afflicted with infected wounds, sores, or any illness, is permitted to work in any area of a food plant in a capacity in which there is a likelihood of such person contaminating food or food contact surfaces with pathogenic organisms.

#### 11.2.2 Personnel hygiene and personal hygiene standards

**11.2.2.1** Plant management shall ensure that everyone entering the production area present himself or herself in a clean and tidy manner and maintain a high standard of personal hygiene.

**11.2.2.2** With respect to the personal hygiene standards the following issues shall be noted.

- a) All personnel are expected to bath daily before entering the factory so as to avoid body odour.
- b) Fingernails shall be short and clean. Nail varnishes and false nails shall be not permitted.
- c) The excessive use of cosmetics for example, perfume, aftershave and make up shall not be allowed. False eyelashes shall not be worn.
- d) No jewellery except a plain wedding band is permitted. Ear clips shall not be worn. Nose studs are unacceptable. Wristwatches and cufflinks shall not be worn.

- e) Purses, handbags etc shall not be allowed in production and packing areas. Suitable and approved secure storage shall be provided.
- f) All sores, cuts, grazes, infected areas and other wounds shall be covered by a suitably coloured waterproof dressing, incorporating a metal strip, by the company and applied by the company medical representative who is responsible for providing first aid.
- g) Any dressing applied shall be accounted for at the end of the shift. The loss of any dressing shall be reported immediately to the management. Where possible, dressings shall be covered by rubber gloves. Staff arriving at work with an unprescribed wound dressing shall have it checked and, if, necessary replaced.
- h) The personnel responsible for quality assurance shall check personnel hygiene regularly and record. Anyone not complying with the regulations on personnel should be requested to leave production areas.

### 11.3 Management of hygienic operating practices

#### 11.3.1 Sanitary maintenance of plant, facilities and premises

**11.3.1.1** The building, equipment, utensils and all other physical facilities of the plant shall be kept in good repair and shall be kept clean and maintained in an orderly, sanitary condition.

**11.3.1.2** Waste materials shall be frequently removed from the working area during plant operation and adequate waste receptacles should be provided.

**11.3.1.3** Detergents and disinfectants employed shall be appropriate to the purpose and shall be so used as to present no hazard to public health.

#### 11.3.2 Management of cleaning and cleaning programmes

##### 11.3.2.1 Cleaning and use of sanitizers

During cleaning, detergents and disinfectants shall be used appropriately. The manufacturers usually indicate instructions for usage of the sanitizer on the label. These shall be translated for use by the workers. Cleaning schedules and use of sanitizers shall be established and should be specific to all areas, surfaces and equipment.

##### 11.3.2.2 Cleaning programmes and routines

The production areas, floors, tables, knives, slicers, gloves, sinks shall be cleaned before beginning a shift and at the end of the shift every day. All these areas need to be cleaned by use of detergents, and then rinsing is done using chlorine based sanitizers as recommended by the manufacturer of the sanitizer.

##### 11.3.2.3 Cleaning routine for the trays

Trays shall be cleaned immediately after emptying the product. They shall be cleaned with detergent, rinsed with water and then sanitized preferably with the chlorine disinfectant sodium hypochlorite. Cleaning may also be done as need be during the shift.

#### **11.3.2.4 Cleaning routine for walls, windows, doors, and ceilings**

These shall be cleaned at least once a week.

#### **11.3.2.5 Cleaning routine for toilets and changing rooms**

These should be cleaned at least twice a day.

#### **11.3.2.6 Cleaning routine for the compound**

This should be cleaned at least once a day.

#### **11.3.2.7 Cleaning routine for uniforms**

Uniforms should be changed at least twice a week.

#### **11.3.2.8 Management of glass**

**11.3.2.8.1** Lighting fixtures, including insect rocuror tubes, in all production and storage areas shall be guarded or sealed with unbreakable enclosures of glass in case of any glass breakage. This shall be kept clean at all times and not allowed to accumulate dust, debris etc.

**11.3.2.8.2** Glassware, glass bottles including soft drink (soda) or beer bottles shall not be allowed in the production areas.

**11.3.2.8.3** Personal watches are not allowed in the production areas.

**11.3.2.8.4** In case of glass breakage, production shall stop immediately. Any affected produce shall be isolated, rejected and dumped and such an incidence recorded. Production shall only resume if there is no further risk of contamination by glass.

### **11.4 Management of pests and toxic substances**

**11.4.1** Effective measures shall be taken to protect against the entrance into the premises and the harborage on the premises of insects, rodents, birds or other vermin.

**11.4.2** Pest control is not just the control of rodents, flies, and birds. It includes all living creatures whether walking, crawling or flying which contaminate the product or environment. The policy shall be one of prevention by the maintenance of good hygiene and housekeeping standards plus adequate screening and proofing of premises to exclude pests, supported by an effective inspection programme.

**11.4.3** Birds shall be prevented from gaining access to the factory buildings. Birds can also be excluded from the external roosting sites on buildings ledges, undersides of canopies etc by use of anti-perching devices.

**11.4.4** All types of domestic animals such as cows, dogs and cats shall be excluded from areas where food is processed or stored and they are unacceptable in any part of the factory exterior areas. Staff shall not feed, or otherwise encourage stray animals.

**11.4.5** Among the requirements for the storage of toxic substances, the following points shall be observed.

**11.4.6** All rodenticides, fumigants, insecticides or other toxic substances shall be stored in separate locked rooms or cabinets and handled only by properly trained personnel

**11.4.7** They shall be used only by or under the direct supervision of personnel with a thorough understanding of the hazards involved, including the possibility of contamination of the product.

**11.4.8** Records shall be kept on their regular application.

**11.4.9** Establish a local beekeeper-farmer-applicator communication network prior to the spray season.

**11.4.10** Choose apiary sites away from intensively sprayed areas. Establish holding yards for honey bees in safe areas so hives can be moved there and fed if necessary during periods when apiaries are at risk.

**11.4.11** Learn about the farmer's pest control problems and programs and develop terms agreeable to both parties regarding procedures which will be followed before a pesticide is applied.

**11.4.12** If spraying is necessary and the bees are at risk, move the bees out of the treatment area. In some cases, for example when Furađan is used at high rates, there appears to be no safe option but to remove the bees prior to treatment.

**11.4.13** Avoid spraying when bees are foraging and plants are flowering

**11.4.14** Avoid contamination from spray liquids by being cautious when mixing and loading, properly disposing waste and other used materials, and cleaning up any spills appropriately.

**11.4.15** Protect pollinator habitats by supplying a constant source of nectar and pollen and creating healthy, diverse gardens that beautify the environment and serve as a food source.

**11.4.16** Communicate and educate farmers on when and how to use crop protection products. Farmers should inform local beekeepers when they are going to apply crop protection products so nearby hives can be moved or otherwise protected.

**11.4.17** Beekeepers also need to follow good management practices with good hygiene, disease control, proper feeding, access to water, genetic diversity and moving hives out of areas to be sprayed.

## **11.5 Management of toilets and cloakrooms**

**11.5.1** Toilet facilities shall be adequate for the number of personnel employed. The facilities shall function properly as well as being kept in a clean condition.

**11.5.2** Hand washing facilities shall be provided next to the toilets.

**11.5.3** "Now Wash Your Hands" notices shall be clearly displayed in bold type on all doors, above urinals, and above washbasins to remind staff of this.

## **11.6 Management of hand washing and hand drying facilities**

**11.6.1** Hand washing facilities shall be provided in toilets and at entrance points of the production areas.

**11.6.2** All personnel entering production areas shall wash their hands. Washing troughs shall be sufficient to allow proper cleansing of hands and forearms for all the staff entering or leaving the area.

**11.6.3** "Now Wash Your Hands" notices shall be clearly displayed in bold type in appropriate places to be a constant reminder to personnel on their responsibility to wash their hands at expected times and also when deemed necessary.

**11.6.4** Only unperfumed, liquid, bactericidal soap shall be provided at all washing locations. Dispensers shall be easy to clean and designed to contact during use.

**11.6.5** Further disinfection or alcohol rinses, is necessary after hand washing as an extra measure to ensure high standards of hygiene.

**11.6.6** Foot or knee operated hand washing facilities are most preferred in high-risk areas.

**11.6.7** Only disposable paper towels are acceptable and suitable dedicated towel dustbins shall be provided and emptied and cleaned regularly. The lids of these bins shall be foot operated.

## **11.7 Management of personnel habits**

**11.7.1** Personnel shall not eat food, spit, smoke, or use tobacco or snuff in production areas.

**11.7.2** Signs for "No Smoking", "No spitting", and "No eating" shall be put up in the production places.

## **11.8 Management of refreshments areas or canteens**

**11.8.1** Eating and drinking shall not be allowed in the production areas including the eating of sweets or chewing gum

**11.8.2** Signs or notices shall be put up prohibiting eating and drinking in the production areas.

**11.8.3** All meals, food or drink shall be taken in the canteen or in the place set aside for this purpose away from the production areas. The canteen or recreating place shall be kept very clean at all times. Failure to do this leads to rodents, cockroaches and other contaminants inhabiting the place and eventually getting to the production areas.

**11.8.4** Glass or soda bottles shall not be taken into production areas.

## 11.9 Management of protective clothing

**11.9.1** All personnel including management and visitors shall wear protective clothing before entering the production areas for whatever purpose.

**11.9.2** The clothing shall be clean and conform to the following:

- a) long sleeved white coats are highly recommended;
- b) all pockets shall be secure and on the inside; and
- c) Buttons are not encouraged. Fastening may be done by use of studs on the inside or by use of Velcro.

**11.9.3** No personal clothing shall be allowed on top of the protective clothing.

**11.9.4** Personnel leaving production areas to visit the canteen, toilets, or any non-production environment, shall leave the protective clothing in changing room.

**11.9.5** Washing of the protective clothing shall be done within the company. Home laundering is not acceptable.

**11.9.6** Suitable foot wear shall be worn and shall be used only in the production areas. Personnel shall wear their own shoes away from the production areas and shall change the shoes before entering the production area.

## 11.10 Personnel hygiene and food handling practices

**11.10.1** All persons working in a food plant shall maintain a high degree of personal cleanliness while on duty. Clothing including suitable headdress shall be appropriate to the duties being performed and shall be kept clean.

**11.10.2** Hands shall be washed as often as necessary to conform to hygienic operating practices.

**11.10.3** All necessary precautions shall be taken to prevent the contamination of the food product or ingredients with any foreign substance.

**11.10.4** Minor cuts and abrasions on the hands shall be appropriately treated and covered with a suitable waterproof dressing. Adequate first-aid facilities shall be provided to meet these contingencies so that there is no contamination of the food

**11.10.5** Gloves used in food handling shall be maintained in a sound, clean and sanitary condition; gloves shall be made of an impermeable material except where their usage would be inappropriate or incompatible with the work involved.

## **12 Operating practices, raw materials and production requirements**

### **12.1 Raw material handling**

#### **12.1.1 Acceptance criteria**

The raw material shall not be accepted by the plant if known to contain decomposed, toxic or extraneous substances that shall not be removed to acceptable levels by normal plant procedures of sorting or preparation.

#### **12.1.2 Storage**

Raw materials stored on the plant premises shall be maintained under conditions that shall protect against contamination and infestation and minimize deterioration.

#### **12.1.3 Water**

Water used for conveying raw materials into the plant shall be from such a source or suitably treated as not to constitute a public health hazard

### **12.2 Preparation and processing**

Preparatory operations leading to the finished product and the packaging operations shall be so timed as to permit expeditious handling of consecutive units in production under conditions which would prevent contamination, deterioration, spoilage, or the development of infectious or toxigenic microorganisms.

### **12.3 Packaging of finished product**

#### **12.3.1 Materials**

Packaging materials shall be stored in a clean and sanitary manner and should not transmit to the product objectionable substances beyond limits and shall provide appropriate protection from contamination.

#### **12.3.2 Techniques**

Packaging shall be done under conditions that preclude the introduction of contamination into the product.

### **12.4 Storage and transport of finished products**

**12.4.1** The finished products shall be stored and transported under such conditions as shall preclude the contamination with or development of pathogenic or toxicogenic microorganisms and protect against rodent and insect infestation and deterioration of the product or of the container.

**12.4.2** The product shall be stored under suitable conditions of time, temperature, humidity, to prevent significant deterioration.

**12.4.3** Where honey and other bee products are stored under conditions in which they may become infested by insects and mites, appropriate methods of protection shall be used regularly.

## **12.5 Sanitation control program**

**12.5.1** It is desirable that each plant in its own interest designates a single individual, whose duties are preferably divorced from production, to be held responsible for the cleanliness of the plant. His staff shall be a permanent part of the organization and shall be well trained in the use of special cleaning tools, methods of disassembling equipment for cleaning, and in the significance of contamination and the hazards involved.

**12.5.2** Critical areas, equipment for cleaning and materials shall be designated for specific attention as part of a permanent sanitation schedule.

## **13 Laboratory control procedures**

**13.1** In addition to any control by the official agency having jurisdiction, it is desirable that each plant in its own interest should have its own or access to laboratory control of the sanitary quality of the products processed. The amount and type of such control shall vary with the bee product as well as the needs of management.

**13.2** Such control should reject all bee products that are unfit for human consumption. Analytical procedures shall be clearly defined and documented.

## **14 End product specifications**

Appropriate methods shall be used for sampling, analysis, and determination in the following specifications:

- a) to the extent possible in good manufacturing practice the products shall be free from objectionable matter;
- b) the products shall not contain any pathogen microorganisms or any toxic substance originating from microorganisms; and
- c) the products shall comply with the requirements on Pesticide Residues and Food Additives as contained in permitted lists or Codex commodity standards.
- d) if packed, the products shall be labelled as stipulated in RS CODEX STAN 1-1985 Rev 4:2005 General standard for the labelling of pre-packaged foods

## **15 Record keeping**

**15.1** Records shall be available and be supplied on demand as evidence to establish food safety. These records shall be legible, permanent, and accurate and be signed and dated by the individual(s) responsible.

**15.2** They should include procedures, controls, limits, and subsequent follow-up documents. They shall be retained for at least one year after the expiration of the durable life date (best before date) or, at least two years after the food has been released to the consumer.

**15.3** The necessary records shall include:

- a) raw material quality control record;
- b) grower/supplier agreements;
- c) stock control record;
- d) company induction for all staff;
- e) training programme;
- f) daily personnel check list;
- g) sanitation record;
- h) water analysis checks;
- i) finished product control record,
- j) lots records including distribution; and
- k) Customer complaints register.

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